

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: MARK RUTH KOSICK Examiner #: 26046 Date: 8/29/00
 Art Unit: 1745 Phone Number 303-50587 Serial Number: PTL45 00116006
 Mail Box and Bldg/Room Location: 4A01 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: PROTON CONDUCTING POLYMER MEMBRANES

Inventors (please provide full names): ALLCOCK, HARRY; HUFMANN, MICHAEL

LVOV, SERGEI; ZHOU, XIANG

Earliest Priority Filing Date: JUNE 11, 1999

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

- THE CLAIMS ARE VERY BROAD MAKING THE SEARCH DIFFICULT. I INCLUDED A COPY IF YOU HAVE ANY GOOD IDEAS FOR A SEARCH.
- KEY WORDS MAY INCLUDE: polyphosphazene, polytetrafluoroethylene OR PTFE, (sulfuric acid, nitric acid, and phosphoric acid would be the most common acids), casting, evaporating, phosphorous oxychloride and maybe oxyacid (which is not a common abbreviation).
- The casting step may be the simplest limitation in the process.
- Thank you!

STAFF USE ONLY

Searcher: SL

Type of Search

Vendors and cost where applicable

Searcher Phone #:

NA Sequence (#)

STN \$364.84

Searcher Location: STIC

AA Sequence (#)

Dialog

Date Searcher Picked Up:

Structure (#)

Questel/Orbit

Date Completed: 8-31-00

Bibliographic

Dr.Link

Searcher Prep & Review Time: 10

Litigation

Lexis/Nexis

Clerical Prep Time:

Fulltext

Sequence Systems

Online Time: 10

Patent Family

WWW/Internet

Other

Other (specify)

We claim:

1. A method for making a proton conducting polymeric membrane comprising

dissolving a polymer in an organic solvent to form a polymer solution;

adding an oxyacid to the polymer solution;

casting the oxyacid-containing polymer solution onto a casting surface, and

removing the organic solvent so as to form a proton conducting polymeric membrane.

2. The method of claim 1 further comprising adding water to the oxyacid-containing polymer solution in a molar ratio equivalent to the oxyacid.

3. The method of claim 1 further comprising concentrating the oxyacid-containing polymer solution prior to casting the oxyacid-containing polymer solution onto the casting surface.

4. The method of claim 1 wherein the polymer is selected from polyphosphazenes, polyalkenes, polyacrylics, polyvinyl ethers, polyvinylhalides, polystyrenes, polyesters, polyurethanes, and polyamides.

5. The method of claim 4 wherein the polymer is a polyphosphazene.

6. The method of claim 1 wherein the organic solvent is tetrahydrofuran.

7. The method of claim 1 wherein the oxyacid is selected from boric, carbonic, cyanic, isocyanic, silicic, nitric, nitrous, phosphoric, phosphorous, hypophosphorous, arsenic, arsenious, antimonic, sulfuric, sulfurous, selenic, selenious, telluric, chromic, dichromic, perchloric, chloric, chlorous, hypochlorous, bromic, bromous, hypobromous, periodic, iodic, hypoiodous, permanganic, manganic, pertechnetic, technetic, perrhenic, rehnnic acids, and their condensation products.

8. The method of claim 1 wherein the oxyacid is phosphorous oxychloride.

9. The method of claim 1 wherein the casting surface is formed of or coated with polytetrafluoroethylene.
10. The method of claim 1 wherein the organic solvent is removed by evaporation.
11. A proton conducting polymeric membrane comprising a mixture of a polyphosphazene and an oxyacid.
12. A proton conducting polymeric membrane made by any of the methods of claims 1-11.
13. A fuel cell comprising the proton conducting polymeric membrane of any of claims 1-12.

PROTON CONDUCTING POLYMER MEMBRANES

Abstract of the Disclosure

Proton conducting membranes having improved resistance to methanol crossover are provided, along with methods for their manufacture. In a preferred embodiment, the polymeric membranes are formed by (a) dissolving a polymer, preferably a polyphosphazene, in an organic solvent to form a polymer solution; (b) adding an oxyacid to the polymer solution; (c) optionally, adding water to the polymer solution, preferably in a molar ratio equivalent to the oxyacid; (d) optionally, concentrating the polymer solution; (e) casting the polymer solution on a casting surface, such as one formed of or coated with TEFLOTM; and (f) removing the organic solvent, so as to form the polymeric membrane. A particularly useful application for these polymeric membranes is in fuel cells, such as those wherein methanol and oxygen are converted into electrical energy.

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=> display history full 11-

(FILE 'HOME' ENTERED AT 09:15:50 ON 31 AUG 2000)

FILE 'REGISTRY' ENTERED AT 09:17:38 ON 31 AUG 2000
E POLYPHOSPHAZENE/CN
E PHOSPHAZENE/CN
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L2 1799 SEA POLYPHOSPHAZENE#
L3 1107 SEA POLYPHOSPHAZENE#/IT

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OR POLYMER? OR COPOLYM# OR COPOLYMER? OR TERPOLYM# OR
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 L46 296648 SEA L44 OR HNO3 OR H3PO4 OR H2SO4
 L47 788 SEA OXYACID#
 L48 45709 SEA FUELCELL? OR (FUEL? OR HYDROGEN# OR H2 OR H) (2A) (CELL
 OR CELLS)
 L49 1950 SEA ((PROTON? OR HYDROGEN# OR H) (2A) (COND# OR CONDUCT?
 OR TRANSFER? OR DIFFUS? OR SUFFUS? OR EFFUS? OR INFUS?)) (25A) MEMBRAN?
 L50 375186 SEA CAST OR CASTS OR CASTED OR CASTING# OR MOULD? OR
 MOLD?

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 L58 4 SEA L57 AND L50
 L59 7 SEA L48 AND L52
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 L61 2468 SEA L48 AND (L45 OR L46 OR L47)
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 L72 5 SEA L69 AND ACID?
 L73 77563 SEA ((PROTON? OR HYDROGEN# OR H) (2A) (COND# OR CONDUCT?
 OR TRANSPORT? OR TRANSFER? OR DIFFUS? OR SUFFUS? OR INFUS?
 OR EFFUS? OR TRANSFUS?))
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L75 2 SEA L74 AND L6
 L76 47 SEA L74 AND L50
 L77 0 SEA L76 AND L52
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 E TEFLON/CN
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 L84 5 SEA L67 AND L82
 L85 7 SEA L54 AND L82
 L86 7 SEA L57 AND L82
 L87 21 SEA L62 AND L82
 L88 38 SEA L53 OR L55 OR L56 OR L58 OR L59 OR L64 OR L71 OR L72
 OR L75 OR L83 OR L84 OR L85 OR L86
 L89 24 SEA (L60 OR L66 OR L80) NOT L88
 L90 34 SEA (L79 OR L87) NOT (L88 OR L89)
 L91 26 SEA L88 AND L65
 L92 17 SEA L89 AND L65
 L93 15 SEA L90 AND L65
 L94 12 SEA L88 NOT L91
 L95 7 SEA L89 NOT L92
 L96 19 SEA L90 NOT L93

=> file hca
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FILE COVERS 1967 - 25 Aug 2000 VOL 133 ISS 9
 FILE LAST UPDATED: 25 Aug 2000 (20000825/ED)

=> d 191 1-26 cbib abs hitstr hitind

L91 ANSWER 1 OF 26 HCA COPYRIGHT 2000 ACS

132:300101 Composite membran suitable for use in electrochemical devices. Murphy, Oliver J.; Cisar, Alan J. (Lynntech, Inc., USA). U.S. US 6059943 A 20000509, 15 pp. (English). CODEN: USXXAM. APPLICATION: US 1998-25680 19980218. PRIORITY: US 1997-PV54150 19970730.

AB The invention relates to novel inorg.-org. composite membranes esp. useful as ionically conducting membranes in electrochem. devices. The composites consist of a polymeric matrix, which may or may not be an ionic conductor in its unfilled form, filled with an inorg. material having a high affinity for water, capable of exchanging cations such as protons, and preferably with a high cation mobility, either on its surface or through its bulk.

IT 9002-84-0, Polytetrafluoroethylene
(composite membrane consisting from polymeric matrix with ion exchanger inorg. filler suitable for use in electrochem. devices)

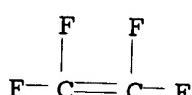
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

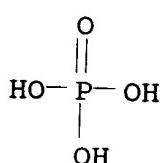
CMF C2 F4



IT 7664-38-2, Phosphoric acid, properties
(interaction with zirconium nitrate with formation of zirconium phosphate used as ion exchanger in polymer composite membrane)

RN 7664-38-2 HCA

CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



IC ICM C25B013-00

NCL 204296000

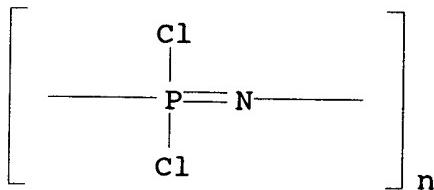
CC 72-3 (Electrochemistry)

ST Section cross-reference(s): 36

composite membran polymer inorg ion exchanger electrochem devices

- IT Fillers
 - (composite membrane consisting from polymeric matrix with inorg. filler suitable for use in electrochem. devices)
- IT Cation exchange membranes
 - Ion exchangers
 - Ionic conductors
 - Porous materials
 - (composite membrane consisting from polymeric matrix with ion exchanger inorg. filler suitable for use in electrochem. devices)
- IT Fluoropolymers, uses
 - (composite membrane consisting from polymeric matrix with ion exchanger inorg. filler suitable for use in electrochem. devices)
- IT Membranes, nonbiological
 - (composite; composite membrane suitable for use in electrochem. devices)
- IT Electric apparatus
 - (electrochem.; composite membrane suitable for use in electrochem. devices)
- IT Polymers, uses
 - (fluorinated; composite membrane consisting from polymeric matrix with inorg. filler suitable for use in electrochem. devices)
- IT Permeability
 - (gas permeability of composite membrane consisting from polymeric matrix with ion exchanger inorg. filler suitable for use in electrochem. devices)
- IT Oxides (inorganic), properties
 - (hydrated; ion exchanger inorg. filler in composite membrane consisting from polymeric matrix with)
- IT 9002-84-0, Polytetrafluoroethylene
 - (composite membrane consisting from polymeric matrix with ion exchanger inorg. filler suitable for use in electrochem. devices)
- IT 17341-24-1, Lithium 1+, properties
 - (composite membrane consisting from polymeric matrix with ion exchanger inorg. filler, Li⁺ conducting)
- IT 17341-25-2, Sodium 1+, properties
 - (composite membrane consisting from polymeric matrix with ion exchanger inorg. filler, Na⁺ conducting)
- IT 12586-59-3, Proton
 - (composite membrane consisting from polymeric matrix with ion exchanger inorg. filler, proton conducting)
- IT 9002-86-2, Polyvinyl chloride
 - (fluorinated; composite membrane consisting from polymeric matrix with inorg. filler suitable for use in electrochem. devices)
- IT 1314-23-4, Zirconia, properties 1314-35-8, Tungsten oxide, properties 11098-99-0, Molybdenum oxide 11113-84-1, Ruthenium oxide 13463-67-7, Titania, properties

- IT 13746-89-9, Zirconium nitrate
 (hydrated; ion exchanger inorg. filler in composite membran consisting from polymeric matrix with)
 IT 7664-38-2, Phosphoric acid, properties
 (interaction with zirconium nitrate with formation of zirconium phosphate used as ion exchanger in polymer composite membrane)
 IT 13772-29-7, Zirconium phosphate
 (ion exchanger inorg. filler in composite membrane consisting from polymeric matrix with)
- L91 ANSWER 2 OF 26 HCA COPYRIGHT 2000 ACS
 132:280105 Polyphosphazene-based cation-exchange membranes: polymer manipulation and membrane fabrication. Guo, Qunhui; Tang, Hao; Pintauro, Peter N.; O'Connor, Sally (Department of Chemistry, Xavier University, New Orleans, LA, 70125, USA). ACS Symp. Ser., 744(Membrane Formation and Modification), 162-173 (English) 2000. CODEN: ACSMC8. ISSN: 0097-6156. Publisher: American Chemical Society.
- AB Poly[bis(3-methylphenoxy)phosphazene] was sulfonated in soln. with SO₃ and soln.-cast into ion-exchange membranes from N,N-dimethylacetamide. Water insol. membranes were prep'd. with an ion-exchange capacity (IEC) as high as 2.1 mmol/g. For water insol. polymers with an IEC < 1.92 mmol/g, there was no evidence of polymer degrdn. during sulfonation. The glass transition temp. of the sulfonated polymer increased from -28.degree.C (for the base polymer) to -10.degree.C for an IEC of 2.1 mmol/g. Equil. water swelling of a phosphazene membrane with an IEC of 0.95 mmol/g was 24% greater than that of a DuPont Nafion 117 cation-exchange membrane. The proton cond. of a water-equilibrated 0.95 mmol/g IEC phosphazene membrane in the H⁺ form ranged from 0.012 S/cm at 25.degree.C to 0.058 S/cm at 60.degree.C. The water diffusion coeff. in a 0.95 mmol/g IEC membrane, at satd. vapor conditions, ranged from 8.0 .times. 10⁻⁸ cm²/s at 25.degree.C to 4.1 .times. 10⁻⁷ cm²/s at 60.degree.C.
- IT 26085-02-9DP, Poly(dichlorophosphazene), methylphenoxy group-contg., sulfonated
 (prepn. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- RN 26085-02-9 HCA
 CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



- CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 37
- ST sulfonated methylphenoxy polyphosphazene cation exchange membrane; glass temp sulfonated methylphenoxy polyphosphazene membrane; proton cond sulfonated methylphenoxy polyphosphazene membrane; water diffusion sulfonated methylphenoxy polyphosphazene membrane
- IT Cation exchange membranes
 Glass transition temperature
 Swelling, physical
 (prepn. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- IT Polyphosphazenes
 (prepn. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- IT Ionic conductivity
 (proton; prepн. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- IT Diffusion
 (water; prepн. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- IT 7732-18-5, Water, processes
 (diffusion; prepн. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- IT 26085-02-9DP, Poly(dichlorophosphazene), methylphenoxy group-contg., sulfonated
 (prepn. and properties of sulfonated poly [bis(methylphenoxy)phosphazene] cation-exchange membranes)
- L91 ANSWER 3 OF 26 HCA COPYRIGHT 2000 ACS
 131:353723 Method for activating fuel cell. Yasumoto, Eiichi; Gyoten, Hisaaki; Hato, Kazuhito; Nishida, Kazufumi; Kanbara, Teruhisa (Matsushita Electric Industrial Co., Ltd., Japan). Eur. Pat. Appl. EP 961334 A2 19991201, 15 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW. APPLICATION: EP 1999-109371

19990601. PRIORITY: JP 1998-150988 19980601; JP 1998-166637
 19980615.

AB A method of activating a polymer electrolyte fuel cell comprising .gtoreq.1 unit cell which is configured by including a proton conductive polymer electrolyte, an electrode layer having a catalytic activity arranged on the both faces of the polymer electrolyte membrane and a gas-supplying path is disclosed. The method comprises .gtoreq.1 of the step (a) of enhancing the catalytic activity of the electrode and the step (b) of giving a wetting condition to the polymer electrolyte. The catalytic activity of the electrode is enhanced by compulsively decreasing the output voltage of the cell in the step (a). A wetting condition to the polymer electrolyte is given by immersing and boiling the cell in a deionized water or weakly acidic aq. soln. and boiling in the step (b).

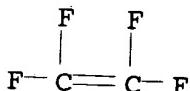
IT 9002-84-0D, trifluoromethyl-terminated, sulfonated (method for activating fuel cell)

RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

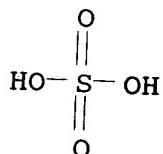
CRN 116-14-3
 CMF C2 F4



IT 7664-93-9, Sulfuric acid, uses (method for activating fuel cell)

RN 7664-93-9 HCA

CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



IC ICM H01M008-10
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38

IT 9002-84-0D, trifluoromethyl-terminated, sulfonated (method for activating fuel cell)

IT 7664-93-9, Sulfuric acid, uses (method for activating fuel cell)

L91 ANSWER 4 OF 26 HCA COPYRIGHT 2000 ACS
 131:339483 Membrane-electrode unit for a fuel cell. Stimming,
 Ulrich (Firma Carl Freudenberg, Germany). PCT Int. Appl. WO 9960650
 A1 19991125, 19 pp. DESIGNATED STATES: W: AU, BR, CA, CN, JP, KR,
 MX, US, ZA; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT,
 LU, MC, NL, PT, SE. (German). CODEN: PIXXD2. APPLICATION: WO
 1999-EP2233 19990401. PRIORITY: DE 1998-19821978 19980518.

AB The invention relates to a membrane electrode unit for a
 fuel cell, comprising an optionally catalyst-coated anode, an
 optionally catalyst-coated cathode and a proton
 conductor located between the anode and the cathode. The
 proton conductor consists of a microfiber-fleece material which has
 been impregnated with an electrolyte to the point of satn. The
 fleece material is chem. inert in relation to the electrolyte at
 temps. of up to +200.degree. and in oxidizing and reducing
 conditions and wts. 20 to 200 g/m². The thickness of the fleece is
 less than 1 mm and the pore vol. is 65 to 92%.

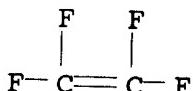
IT 9002-84-0D, Ptfe, sulfonated perfluorovinyl ether
 side chain

(membrane-electrode unit for fuel cell)
 RN 9002-84-0 HCA

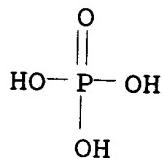
CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

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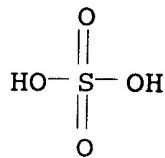
CRN 116-14-3
 CMF C2 F4



IT 7664-38-2, Phosphoric acid, uses
 (membrane-electrode unit for fuel cell)
 RN 7664-38-2 HCA
 CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



IT 7664-93-9, Sulfuric acid, uses
 (microfiber fleece impregnated with; membran -electrode
 unit for fuel cell)
 RN 7664-93-9 HCA
 CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



IC ICM H01M008-10
 ICS H01M008-02
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
 ST fuel cell membrane electrode unit
 IT Polyoxyalkylenes, uses
 (fluorine- and sulfo-contg., ionomers, microfiber fleece coated
 with; membrane-electrode unit for fuel cell)
 IT Ionomers
 (fluoropolymers; membrane-electrode unit for fuel cell)
 IT Fluoropolymers, uses
 (ionomers; membrane-electrode unit for fuel cell)
 IT Fuel cells
 (membrane-electrode unit for fuel cell)
 IT Fluoropolymers, uses
 (polyoxyalkylene-, sulfo-contg., ionomers, microfiber fleece
 coated with; membrane-electrode unit for fuel cell)
 IT Ionomers
 (polyoxyalkylenes, fluorine- and sulfo-contg., microfiber fleece
 coated with; membrane-electrode unit for fuel cell)
 IT Fluoropolymers, uses
 (sulfonated perfluorovinyl ether side chain; membrane
 -electrode unit for fuel cell)
 IT 7783-28-0, Ammonium hydrogen phosphate 13765-95-2, Zirconium
 phosphate
 (hydrated, microfiber fleece impregnated with; membrane
 -electrode unit for fuel cell)
 IT 9002-84-0D, Ptfe, sulfonated perfluorovinyl ether
 side chain
 (membrane-electrode unit for fuel cell)
 IT 7664-38-2, Phosphoric acid, uses
 (membrane-electrode unit for fuel cell)
 IT 7664-93-9, Sulfuric acid, uses
 (microfiber fleece impregnated with; membrane-electrode
 unit for fuel cell)

L91 ANSWER 5 OF 26 HCA COPYRIGHT 2000 ACS
 131:260030 Nonpoisoning fuel cell and methods of operating the same with
 carbonaceous fuels. Yepez, Omar (Westfield Trading Corporation,
 USA). PCT Int. Appl. WO 9953560 A1 19991021, 39 pp. DESIGNATED
 STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU,
 CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE,
 KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX,

NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA,
 UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT,
 BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR,
 IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English).
 CODEN: PIXXD2.

APPLICATION: WO 1998-US7373 19980408.

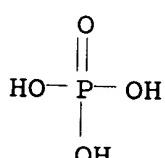
AB Fuel cell of the type that uses, as a fuel, a carbon compd. which undergoes electrooxidn. in the fuel cell comprises: a cathode, an electrolyte, and an anode. The anode has a first face that is fluid permeable and a second face which is in contact with the electrolyte. The second face comprises an at. hydrogen transmissive membrane made of an electrocatalytic metallic element which stores and diffuses hydrogen in at. form. This membrane has an absorption side and an opposite insertion reaction side. There is also provided a method of generating electricity in a fuel cell as described generally and in any of the specific embodiments described above. This method comprises the sequential steps of: absorbing a hydrogen contg. medium on the absorption side of the at. hydrogen transmissive membrane, passing hydrogen in at. form, through the membrane to the opposite insertion reaction side of this membrane, providing a carbon compd. to this insertion reaction side, allowing the direct electrooxidn. reaction of the carbon compd. on the insertion reaction side to give an electrooxidn. product, chem. reacting this with the hydrogen passed through the membrane to give a redn. reaction product, further electrooxidizing this redn. reaction product to provide carbon dioxide, as the principal product of the complete electrochem. oxidn. of the carbon compd.; and drawing electricity generated thereby in the fuel cell from its cathode and anode.

IT 7664-38-2, Phosphoric acid, uses 9002-84-0

(nonpoisoning fuel cell and methods of operating with carbonaceous fuels)

RN 7664-38-2 HCA

CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



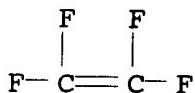
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



- IC ICM H01M008-08
 ICS H01M008-10; H01M004-86
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 72
 IT 144-55-8, Sodium bicarbonate, uses 7664-38-2, Phosphoric acid, uses 9002-84-0
 (nonpoisoning fuel cell and methods of operating with carbonaceous fuels)
- L91 ANSWER 6 OF 26 HCA COPYRIGHT 2000 ACS
 131:229503 Effect of plasticizers on the microstructure and conductive properties of polymeric ionomers from EPDM. Bashir, H.; Linares, A.; Acosta, J. L. (Instituto de Ciencia y Tecnologia de Polimeros del CSIC, Madrid, 28006, Spain). Rev. Plast. Mod., 77(515), 529-535 (Spanish) 1999. CODEN: RPMOAM. ISSN: 0034-8708. Publisher: Asociacion para el Fomento de la Ciencia y de la Tecnica.
- AB Proton-conducting ionomers based on high-norbornene EPDM (Vistalon 9500, Exxon Chem.) were obtained by sulfonation of EPDM using acetyl sulfate prep'd. in situ from acetic anhydride and H₂SO₄. The sulfonated polymer was formulated with plasticizers by kneading at room temp.; the material was press-molded to form membranes and the membranes were characterized by DSC, dynamic mech. anal., photoelectronic spectrometry, and complex impedance spectroscopy. The cond. of the membranes increased with level of hydration of the membrane, even if the no. of sulfonate groups is not the largest, in fact, larger content of sulfonate groups results in a more rigid structure that prevents diffusion of water and adversely affects cond. Conventional plasticizers, Bu phthalate and paraffin oil enhance processability and dimensional stability of the membranes but cause a decrease in cond. due to poor hydrophilicity and swelling. The membranes are suitable for use in solid-state fuel cells.
- CC 37-5 (Plastics Manufacture and Processing)
 Section cross-reference(s): 38, 52
- ST sulfonated EPDM ionomer membrane microstructure water diffusion; plasticizer effect morphol sulfonated EPDM membrane; fuel cell membrane sulfonated EPDM ionomer
- IT EPDM rubber
 (Vistalon 9500, sulfonated; role of sulfonation level and plasticizers on microstructure and diffusivity of proton conductive ionomer EPDM m mbran s)
- IT Ionic conductivity
 (proton; role of sulfonation level and plasticizers on microstructure and diffusivity of proton

IT **conductiv ionomer EPDM m mbranes)**
 Hydrophilicity
 Plasticizers
 Polymer morphology
 Sulfonation
 Swelling, physical
 (role of sulfonation level and plasticizers on microstructure and
diffusivity of proton conductive
ionomer EPDM membranes)

IT Paraffin oils
 (role of sulfonation level and plasticizers on microstructure and
diffusivity of proton conductive
ionomer EPDM membranes)

IT Diffusion
 (water; role of sulfonation level and plasticizers on
 microstructure and **diffusivity of proton**
conductve ionomer EPDM membranes)

IT 7732-18-5, Water, processes
 (diffusion; role of sulfonation level and plasticizers on
 microstructure and **diffusivity of proton**
conductve ionomer EPDM membranes)

IT 84-74-2, Butyl phthalate
 (role of sulfonation level and plasticizers on microstructure and
diffusivity of proton conductive
ionomer EPDM membranes)

L91 ANSWER 7 OF 26 HCA COPYRIGHT 2000 ACS
 130:268018 ~~Proton-conducting phosphoric acid polyesters.~~ Florjanczyk,
 Zbigniew; Bzducha, Wojciech; Wroblewski, Robert; Cieslicki, Pawel;
 Zygallo-Monikowska, Ewa (Wydz. Chemiczny, Politechnika Warszawska,
 Warsaw, 00-664, Pol.). Polimery (Warsaw), 44(1), 18-23 (Polish)
 1999. CODEN: POLIA4. ISSN: 0032-2725. Publisher: Instytut Chemii
 Przemyslowej.

AB Arom. and aliph. polyesters of phosphoric acid were studied as
 potential components of **proton-conducting**
membranes. The arom. esters were obtained by hydrolysis of
 the products of condensation of **phosphorus**
oxychloride with bisphenol A; the aliph. polyesters were
 obtained by polyaddn. of phosphoric acid to diglycidyl ether of
 bisphenol A. The arom. derivs. were found to be hydrolytically
 stable enough to be applicable as components of proton-conducting
 hydrogels. The ionic conductivities of the composite
 membranes of the polyesters and of N,N'-
 methylenediacrylamide and poly(vinylidene fluoride) ranged from 10-4
 to 10-3 S.cm⁻¹. The aliph. polyesters hydrolyzed with water
 at room temp. to yield low-mol.-wt. oligomers and even after having
 been immobilized in hydrophobic polymeric networks were easy to wash
 out. They can be used to synthesize conducting gels with org.
 solvents used as the conducting phase.

CC 37-3 (Plastics Manufacture and Processing)
 Section cross-reference(s): 76

ST phosphoric acid polyester gel prepн elec cond; proton

- IT **conducting membrane phosphoric acid polyester gel
M mbranes (nonbiological)**
 (elec. conductiv ; prepн. of proton-
**conducting phosphoric acid polyesters and
membranes based on them)**
- IT **Polymer blends**
 (polyvinylidene fluoride-phosphoric acid polyester; prepн. of
proton-conducting phosphoric acid polyesters
 and **membranes based on them**)
- IT **Conducting polymers**
Proton conductivity
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)
- IT **Ionomers**
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)
- IT **Fluoropolymers, uses**
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)
- IT 110-26-9DP, N,N'-Methylenebis(acrylamide), polymers with hydrolyzed
 bisphenol A-phosphonyl trichloride copolymer 62765-05-3DP,
 Bisphenol A-phosphonyl trichloride copolymer, sru, hydrolyzed,
 optionally N,N'-methylenebis(acrylamide)-crosslinked 68664-05-1DP,
 Bisphenol A-phosphonyl trichloride copolymer, hydrolyzed, optionally
 N,N'-methylenebis(acrylamide)-crosslinked
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)
- IT 24937-79-9, Polyvinylidene fluoride
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)
- IT 62765-05-3P, Bisphenol A-phosphonyl trichloride copolymer, sru
 68664-05-1P, Bisphenol A-phosphonyl trichloride copolymer
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)
- IT 126710-34-7P
 (prepн. of **proton-conducting phosphoric acid**
 polyesters and **membranes based on them**)

L91 ANSWER 8 OF 26 HCA COPYRIGHT 2000 ACS

130:224122 Gas separation **membranes** based on regiospecific
 polyamide-polyimides. Langsam, Michael (Air Products and Chemicals,
 Inc., USA). Eur. Pat. Appl. EP 900588 A1 19990310, 14 pp.
 DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI,
 LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN:
 EPXXDW. APPLICATION: EP 1998-116572 19980902. PRIORITY: US
 1997-924729 19970905.

AB The polyamide-polyimides are cast to form
membranes which exhibit superior gas sepn. properties when
 compared to polyamide-polyimide **membran s** formed from
 random copolymers. The polymers are prepд. by reacting specific
 arom. diimide dicarboxylic acids with select arom.
 diamines.

IC ICM B01D071-64
 ICS B01D053-22; C08G073-14
 CC 38-3 (Plastics Fabrication and Uses)
 Section cross-reference(s): 35
 ST regiospecific polyamide polyimide membrane; nitrogen
 oxygen sepn polyamide polyimide membrane; arom diimide
 dicarboxylic acid diamine copolymer
 IT **Membranes** (nonbiological)
 (gas-sepn.; gas-sepn. membranes based on regiospecific
 polyamide-polyimides)
 IT Polyimides, uses
 (polyamide-; gas-sepn. membranes based on regiospecific
 polyamide-polyimides)
 IT Polyamides, uses
 (polyimide-; gas-sepn. membranes based on regiospecific
 polyamide-polyimides)
 IT **Polyphosphazenes**
 Polysiloxanes, uses
 (thin films, for membrane coatings; gas-sepn.
 membranes based on regiospecific polyamide-polyimides)
 IT 61736-00-3P 193143-36-1P 221012-84-6P 221012-85-7P
 221012-86-8P 221012-87-9P 221012-88-0P 221012-89-1P
 221012-90-4P 221012-91-5P 221012-92-6P 221012-93-7P
 221012-94-8P 221012-95-9P 221012-96-0P 221012-97-1P
 221012-98-2P 221012-99-3P 221013-00-9P 221013-01-0P
 221013-02-1P 221013-03-2P 221045-98-3P 221045-99-4P
 221046-00-0P 221046-01-1P 221046-02-2P 221046-08-8P
 221046-14-6P 221046-23-7P 221105-85-7P 221107-44-4P
 221107-45-5P 221107-46-6P
 (gas-sepn. membranes based on regiospecific
 polyamide-polyimides)
 IT 552-30-7, Trimellitic anhydride 823-40-5, 2,6-Toluenediamine
 (gas-sepn. membranes based on regiospecific
 polyamide-polyimides)
 IT 4649-31-4P 4649-33-6P 159523-76-9P 160072-12-8P 221012-81-3P
 221105-84-6P
 (gas-sepn. membranes based on regiospecific
 polyamide-polyimides)

L91 ANSWER 9 OF 26 HCA COPYRIGHT 2000 ACS
 130:200850 Polyphosphazene membranes and

microspheres in periodontal diseases and implant surgery. Veronese,
 Francesco M.; Marsilio, Franco; Lora, Silvano; Caliceti, Paolo;
 Passi, Piero; Orsolini, Piero (Department of Pharmaceutical
 Sciences, University of Padova, Padua, 35128, Italy). Biomaterials,
 Volume Date 1999, 20(1), 91-98 (English) 1998. CODEN: BIMADU.
 ISSN: 0142-9612. Publisher: Elsevier Science Ltd..

AB Membranes or microcapsules made from
polyphosphazene s bearing amino acid side groups are proposed
for the treatment of periodontal diseases. Polyphosphazene
m branes, prepd. with alanine Et ester and imidazole in a
molar ratio of 80:20 as phosphorus substituents, gave a degrdn. rate

that corresponded to the healing of the bone defect. These membranes were much more successful in promoting healing of rabbit tibia defects than polytetrafluoroethylene membranes. Antibacterial or anti-inflammatory drugs, useful in periodontal tissue regeneration, could be entrapped in the polyphosphazene membranes and released both in vitro and in vivo at a rate that ensured therapeutic concns. in the surrounding tissue. Polyphosphazene microspheres, prep'd. with phenylalanine Et ester as a phosphorus substituent and loaded with succinylsulfathiazole or naproxen, were also obtained. The kinetics of release from these matrixes were very convenient in yielding local concns. of the 2 drugs that are useful per se or when mixed with hydroxyapatite for better bone formation.

IT 25231-98-5P, Hexachlorocyclotriphosphazene homopolymer
26085-02-9P, Poly[nitrilo(dichlorophosphoranylidyne)]

(polyphosphazene membranes and microspheres
in periodontal diseases and implant surgery)

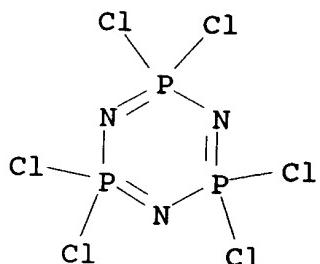
RN 25231-98-5 HCA

CN 1,3,5,2,4,6-Triazatriphosphorine, 2,2,4,4,6,6-hexachloro-2,2,4,4,6,6-hexahydro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

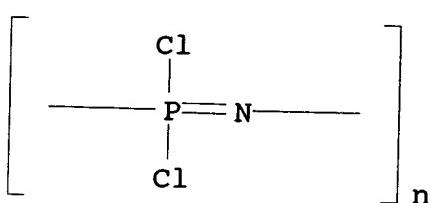
CRN 940-71-6

CMF Cl6 N3 P3



RN 26085-02-9 HCA

CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



IT 25231-98-5DP, Hexachlorocyclotriphosphazene homopolymer,
reaction products with amino acids 26085-02-9DP,

Poly[nitrilo(dichlorophosphoranylidyne)], reaction products with amino acids

(**polyphosphazene membranes and microspheres in periodontal diseases and implant surgery**)

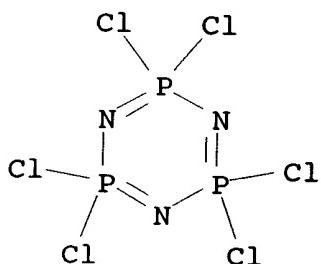
RN 25231-98-5 HCA

CN 1,3,5,2,4,6-Triazatriphosphorine, 2,2,4,4,6,6-hexachloro-2,2,4,4,6,6-hexahydro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

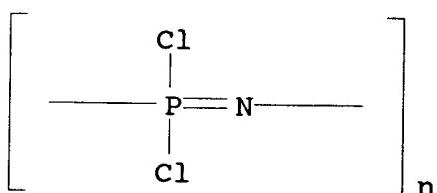
CRN 940-71-6

CMF Cl6 N3 P3



RN 26085-02-9 HCA

CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



CC 63-6 (Pharmaceuticals)

ST **polyphosphazene membrane microsphere periodontal disease prepn; implant polyphosphazene membrane prepn**

IT Bone defects

Dissolution rate

Periodontal diseases

Prosthetic implants

(**polyphosphazene membranes and microspheres in periodontal diseases and implant surgery**)

IT **Polyphosphazenes**

(**polyphosphazene membranes and microspheres in periodontal diseases and implant surgery**)

IT 25231-98-5P, Hexachlorocyclotriphosphazene homopolymer
26085-02-9P, Poly[nitrilo(dichlorophosphoranylidyne)]

IT (polyphosphazene membran s and microspheres
in periodontal diseases and implant surgery)
288-32-4DP, Imidazole, reaction products with
polyphosphazenes 1115-59-9DP, L-Alanine ethyl ester
hydrochloride, reaction products with **polyphosphazenes**
3182-93-2DP, L-PhenylAlanine ethyl ester hydrochloride, reaction
products with **polyphosphazenes** 25231-98-5DP,
Hexachlorocyclotriphosphazene homopolymer, reaction products with
amino acids 26085-02-9DP, Poly[nitrilo(dichlorophosphorany
lidyne)], reaction products with amino acids
(**polyphosphazene membranes** and microspheres
in periodontal diseases and implant surgery)

L91 ANSWER TO OF 26 HCA COPYRIGHT 2000 ACS

130:158450 Use of hyaluronic acid derivatives in the preparation of
biomaterials with a physical hemostatic and plugging activity and a
preventive activity in the formation of adhesions following
anastomosis. Rivarossa, Alberto; Pressato, Daniele (Fidia Advanced
Biopolymers, S.R.L., Italy). PCT Int. Appl. WO 9904828 A2 19990204,
60 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BA, BB, BG, BR,
BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU,
ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD,
MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL,
TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD,
RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES,
FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD,
TG. (English). CODEN: PIXXD2. APPLICATION: WO 1998-EP4716
19980728. PRIORITY: IT 1997-PD170 19970728.

AB Polysaccharide derivs. are used for the prepn. of biocompatible and
biodegradable biomaterials with absorbent properties for body fluids
and phys. hemostatic activity. They are used in both venous and
arterial vascular anastomoses and to prevent the formation of
post-surgical adherence of the vessels with the surrounding tissues
scar formation. Autocrosslinked derivs. of hyaluronic acid in the
form of a 5% gel was prepnd. Rats underwent venous anastomosis in
hind limbs and the veins were cover with above gels. The mean
bleeding time was reduced and less fibrosis and reduced formation of
scar tissue around the treated vessels was obsd.

IT 9002-84-0, Ptfe

(use of hyaluronic acid derivs. in prepn. of biomaterials with
phys. hemostatic and plugging activity and preventive activity in
formation of adhesions following anastomosis)

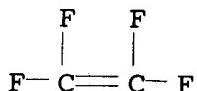
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



IC ICM A61L015-00
 CC 63-7 (Pharmaceuticals)
 Section cross-reference(s): 35, 38
 IT Adhesion (biological)
 Anti-inflammatory drugs
 Antibiotics
 Antithrombotics
 Biological materials
 Gels (drug delivery systems)
 Gums
 Hemostatics
Membranes (nonbiological)
 Microcapsules (drug delivery systems)
 Microspheres (drug delivery systems)
 Nonwoven fabrics
 Prostheses
 Sutures
 (use of hyaluronic acid derivs. in prepn. of biomaterials with
 phys. hemostatic and plugging activity and preventive activity in
 formation of adhesions following anastomosis)
 IT Collagens, biological studies
 Fluoropolymers, biological studies
 Glycosaminoglycans, biological studies
Polyphosphazenes
 Polysulfones, biological studies
 Polyurethanes, biological studies
 (use of hyaluronic acid derivs. in prepn. of biomaterials with
 phys. hemostatic and plugging activity and preventive activity in
 formation of adhesions following anastomosis)
 IT 1398-61-4, Chitin 9000-69-5, Pectin 9002-18-0, Agar
9002-84-0, Ptfe 9004-34-6, Cellulose, biological
 studies 9005-25-8, Starch, biological studies 9005-32-7, Alginic
 acid 9005-32-7D, Alginic acid, derivs. 9012-36-6, Agarose
 9012-76-4, Chitosan 9046-40-6, Pectic acid 11138-66-2, Xanthan
 gum 26023-30-3, Poly[oxy(1-methyl-2-oxo-1,2-ethanediyl)]
 26100-51-6, Polylactic acid 26124-68-5, Polyglycolic acid
 28552-22-9, Polydioxane 34346-01-5, Lactic acid glycolic acid
 copolymer 142804-65-7D, Gellan, derivs.
 (use of hyaluronic acid derivs. in prepn. of biomaterials with
 phys. hemostatic and plugging activity and preventive activity in
 formation of adhesions following anastomosis)

L91 ANSWER 11 OF 26 HCA COPYRIGHT 2000 ACS
 130:141587 Sulfonated and crosslinked **polyphosphazene** -based
 proton-exchange **membranes**. Guo, Qunhui; Pintauro, Peter
 N.; Tang, Hao; O'Connor, Sally (Department of Chemistry, Xavier

University, New Orleans, LA, 70125, USA). J. Membr. Sci., 154(2), 175-181 (English) 1999. CODEN: JMESDO. ISSN: 0376-7388.

Publisher: Elsevier Science B.V..

- AB Proton-exchange membranes, for possible use in H₂/O₂ and direct methanol fuel cells have been fabricated from poly [bis(3-methylphenoxy)phosphazene] by first sulfonating the base polymer with SO₃ and then soln.-casting thin films. The ion-exchange capacity of the membrane was 1.4 mmol/g. Polymer crosslinking was carried out by dissolving benzophenone photoinitiator in the membrane casting soln. and then exposing the resulting films after solvent evapn. to UV light. The crosslinked membranes look particularly promising for possible proton exchange membrane fuel cell applications.
- A sulfonated and crosslinked polyphosphazene membrane swelled less than Nafion 117 in both water and methanol. Proton conductivities in crosslinked and non-crosslinked 200 .mu.m thick water-equilibrated polyphosphazene films at temps. of 25-65.degree. were essentially the same and only 30% lower than those for Nafion 117. Addnl., water and methanol diffusivities in the crosslinked polyphosphazene membrane were very low (.1toreq.1.2 .times. 10⁻⁷ cm²/s). Sulfonated/crosslinked polyphosphazene films showed no signs of mech. failure (softening) up to 173.degree. and a pressure of 800 kPa and did not degrade chem. when soaked in a hot hydrogen peroxide/ferrous ion soln.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST Section cross-reference(s): 38
- ST polymethylphenoxyphosphazene sulfonated crosslinked proton exchange membrane; fuel cell proton exchange membrane
- IT Polyphosphazenes
(phenoxy; prepn. and characterization of sulfonated and crosslinked polyphosphazene-based proton-exchange membranes for fuel cells)
- IT Fuel cell separators
(prepn. and characterization of sulfonated and crosslinked polyphosphazene-based proton-exchange membranes for fuel cells)
- IT Membranes (nonbiological)
(proton exchange; prepn. and characterization of sulfonated and crosslinked polyphosphazene-based proton-exchange membranes for fuel cells)
- IT 52233-65-5D, sulfonated
(UV-crosslinked; prepn. and characterization of sulfonated and crosslinked polyphosphazene-based proton-exchange membranes for fuel cells)

L91 ANSWER 12 OF 26 HCA COPYRIGHT 2000 ACS

128:158068 Study of the factors affecting mass transport in electrochemical gas sensors. Hitchman, Michael L.; Cade, Nigel J.; Gibbs, T. Kim; Headley, Nicholas J. M. (Dep. of Pure and Applied Chemistry, University of Strathclyde, Glasgow, G1 1XL, UK). Analyst

AB (Cambridge, U. K.), 122(11), 1411-1417 (English) 1997. CODEN: ANALAO. ISSN: 0003-2654. Publisher: Royal Society of Chemistry. The effect of various diffusion barriers on the mass transport controlled current for an amperometric gas sensor with a porous membrane was studied. A general equation was derived which relates total current to diffusion parameters for each barrier. By varying the thickness of one barrier at a time, keeping all the other parameters const., the relative roles of each barrier was detd. This was done for CO and H₂S sensors; in both cases >70% of transport control was provided by the electrolyte film in the porous electrode/membrane. This conclusion was supported by observations of the temp. dependence of sensor currents. It was concluded that, to obtain more consistent, reproducible results from porous membrane-covered amperometric gas sensors, a more controllable method of electrode manuf. and assembly is desirable.

IT 9002-84-0, PTFE

(diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)

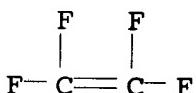
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

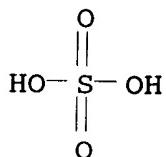
CMF C2 F4



IT 7664-93-9, Sulfuric acid, uses
(sensor electrolyte; diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)

RN 7664-93-9 HCA

CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



CC 59-1 (Air Pollution and Industrial Hygiene)
Section cross-reference(s): 47, 79, 80

IT Gas sensors

(amperometric electrochem.; diffusion barrier thickness and temp.)

- IT effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membran)
 IT Electric current
 Mass transfer
 (diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)
 IT Fluoropolymers, uses
 (diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)
 IT Gas analysis
 (toxic; diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)
 IT 630-08-0, Carbon monoxide, analysis 7783-06-4, Hydrogen sulfide, analysis
 (diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)
 IT 9002-84-0, PTFE
 (diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)
 IT 7664-93-9, Sulfuric acid, uses
 (sensor electrolyte; diffusion barrier thickness and temp. effect on mass transport controlled current in amperometric electrochem. gas sensors equipped with porous membrane)

L91 ANSWER 13 OF 26 HCA COPYRIGHT 2000 ACS
 128:77667 Cylindrical proton exchange membrane fuel cells and methods of making same. Bass, Edward Albert; Merritt, Patrick Martin; Sharp, Christopher Alan; Wall, Craig Marshall; Campbell, John (Southwest Research Institute, USA). PCT Int. Appl. WO 9747052 A1 19971211, 47 pp. DESIGNATED STATES: W: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2.
 APPLICATION: WO 1997-US9659-1997-0605. PRIORITY: US 1996-19182 19960605.

AB Methods are described for manufg. a cylindrical fuel cell comprising providing an anode from a solid cylindrical porous conductive matrix with outer surface intimately contacting a first proton exchange catalyst; conforming an inner polymer electrolyte membrane , with outer and inner surface, around and in intimate contact with the anode outer surface, where the membran inner surface defines a tubular compartment and ionically communicates with the first proton exchange catalyst; providing a source of hydrogen gas in communication with the first proton exchange catalyst; and,

disposing a cathode comprising a catalytically effective amt. of a second proton exchange catalyst around and in ionic communication with the **membran** outer surface. A source of oxygen gas is in communication with the second proton exchange catalyst. The tubular compartment can be packed with a powder comprising carbon and a first proton exchange catalyst to form the rigid porous anode. The cathode can be formed by packing a mixt. of a carbon powder and catalyst powder into an annular space defined by an inner wall of an outer polymer electrolyte **membrane** tubule and the **membrane** outer surface. In examples, fuel cells were manufd. by soln. **casting**, using a rolled sheet construction, **sputtering**, in situ extrusion **casting** using the electrodes as a **mold** for precursor gel or soln. of the solid electrolyte **membrane**, or using tubular polymer electrolyte **membranes** to result in a "sausage" type of structure. Current collectors are provided for the anode and cathode.

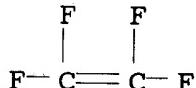
IT 9002-84-0, **Teflon**
 (cylindrical proton exchange **membrane** fuel cells and
 manufg. methods)

RN 9002-84-0 **HCA**

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3
 CMF C2 F4



IC ICM H01M004-90
 ICS H01M004-96; H01M008-10

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38, 57

ST proton exchange **membrane** fuel cell manuf

IT **Casting** of polymeric materials
 Extrusion of polymeric materials
 Gas diffusion electrodes
 Sputtering
 (cylindrical proton exchange **membrane** fuel
 cells and manufg. methods)

IT Carbon black, uses
 (cylindrical proton exchange **membrane** fuel cells and
 manufg. methods)

IT Carbon fibers, uses
 Fluoropolymers, uses
 (cylindrical proton exchange **membrane** fuel cells and
 manufg. methods)

- IT Polyoxyalkylenes, uses
 (fluorine- and sulfo-contg., ionomers; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT Fluoropolymers, uses
 (polyoxyalkylene-, sulfo-contg., ionomers; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT Ionomers
 (polyoxyalkylenes, fluorine- and sulfo-contg.; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT Fuel cells
 (proton exchange membrane; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT Wire
 (stainless steel; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT 7440-06-4, Platinum, uses
 (cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT 9002-84-0, Teflon 77950-55-1, Nafion 115
 (cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT 1333-74-0, Hydrogen, uses 7782-44-7, Oxygen, uses
 (cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT 7440-44-0, Carbon, uses
 (paper, powd., sleeve, cloth; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT 7782-42-5, Graphite, uses
 (rods; cylindrical proton exchange membrane fuel cells and manufg. methods)
- IT 12597-68-1, Stainless steel, uses
 (screen, cloth, wire; cylindrical proton exchange membrane fuel cells and manufg. methods)

L91 ANSWER 14 OF 26 HCA COPYRIGHT 2000 ACS

124:352798 Preparation of bonded fiber structures for cell implantation.

Mikos, Antonios G.; Langer, Robert S. (Massachusetts Institute of Technology, USA). U.S. US 5512600 A 19960430, 7 pp. (English). CODEN: USXXAM. APPLICATION: US 1993-5910 19930115.

AB A novel processing technique is reported to bond non-woven fibers and, thus, prep. structural interconnecting fiber networks with different shapes for organ implants. The fibers are phys. joined without any surface or bulk modification and have their initial diam. Poly(L-lactic acid) dissolved in methylene chloride was cast into a petri dish contg. a nonwoven mesh of polyglycolic acid fibers to obtain a composite membrane, which was heat-treated and then poly(L-lactic acid) matrix was selectively dissolved in methylene chloride to give a bonded polyglycolic acid fiber. The bonded fiber was seeded with hepatocytes for use as a transplantation device.

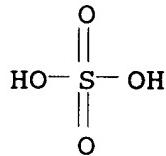
IC ICM C08K009-00

NCL 521061000
CC 63-7 (Pharmaceuticals)
Section cross-reference(s): 40
IT Phosphazene polymers
Polyanhydrides
Polyester fibers, biological studies
(manuf. of bonded fiber structures for cell implantation)
IT 9003-01-4, Acrylic acid polymer 24937-78-8, Ethylene
vinyl acetate copolymer 25087-26-7, Methacrylic acid
polymer 26009-03-0, Polyglycolic acid 26124-68-5,
Polyglycolic acid 26161-42-2 26811-96-1, Poly(L-lactic
acid) 34346-01-5, Lactic acid-glycolic
acid copolymer
(manuf. of bonded fiber structures for cell implantation)

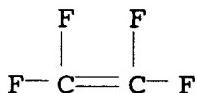
L91 ANSWER 15 OF 26 HCA COPYRIGHT 2000 ACS
124:327146 Microelectrode investigation of oxygen permeation in perfluorinated proton exchange membranes with different equivalent weights. Buechi, Felix N.; Wakizoe, Masanobu; Srinivasan, Supramaniam (Center Electrochem. Systems Hydrogen Res., Tx. Eng. Experiment Station, Texas A & M Univ. System, College Station, TX, 77843, USA). J. Electrochem. Soc., 143(3), 927-32 (English) 1996. CODEN: JESOAN. ISSN: 0013-4651.

AB The oxygen concns. (Cb) and diffusion coeffs. (D) in various proton-exchange membranes were measured by chronoamperometry at microelectrodes. These measurements were made under conditions similar to those prevailing in proton-exchange-membrane fuel cells. Knowledge of the D and Cb parameters is essential for the detn. of oxygen permeation in the catalytic layers of gas diffusion electrodes, which could be rate limiting in these low-temp. fuel cells. Furthermore, the D and Cb values also provide the permeation rates of oxygen through the bulk of the proton-conducting membrane. The concn. of oxygen increased and the diffusion coeff. decreased with increasing equiv. wt. of the membranes. These results were interpreted by using a model based on the microstructure of the swollen membranes sep'd. into 2 phases, one hydrophobic and the other hydrophilic, with distinctly different O₂-permeation properties. According to this model, the relative amts. of the 2 phases in the membranes, caused by the different water contents, det. the O₂ solv. and diffusion coeff. in the different membrane materials.

IT 7664-93-9, Sulfuric acid, uses
(oxygen permeation in sulfuric acid)
RN 7664-93-9 HCA
CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



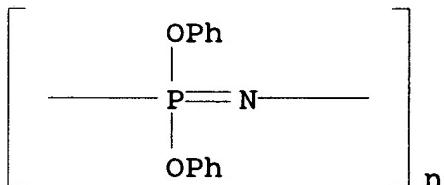
IT **9002-84-0, PTFE**
 (proton-exchange membrane; oxygen permeation in
 perfluorinated proton exchange membranes)
 RN 9002-84-0 HCA
 CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)
 CM 1
 CRN 116-14-3
 CMF C2 F4



CC 72-2 (Electrochemistry)
 Section cross-reference(s): 52, 67
 ST microelectrode oxygen permeation proton exchange membrane;
 perfluorinated proton exchange membrane oxygen permeation;
 fuel cell proton exchange membrane oxygen
 IT Diffusion
 (diffusion coeffs. of oxygen in perfluorinated proton exchange
 membranes)
 IT Membranes
 (oxygen permeation in perfluorinated)
 IT Fuel cells
 (proton-exchange membrane; oxygen permeation in
 perfluorinated proton exchange membranes for fuel
 cells)
 IT 7440-06-4, Platinum, uses
 (electrode catalyst; oxygen permeation in perfluorinated proton
 exchange membranes investigated with platinum
 microelectrodes)
 IT **7664-93-9, Sulfuric acid, uses**
 (oxygen permeation in sulfuric acid)
 IT 7782-44-7, Oxygen, properties
 (permeation of oxygen in perfluorinated proton exchange
 membranes)
 IT **9002-84-0, PTFE 63346-31-6, Nafion 120**
 77950-55-1, Nafion 115 176366-08-8, Aciplex S 885 176366-09-9,
 Aciplex S 1004 176366-10-2, Aciplex S 1104
 (proton-exchange m mbran ; oxygen permeation in

perfluorinated proton exchange m mbranes)

- L91 ANSWER 16 OF 26 HCA COPYRIGHT 2000 ACS
 122:294168 Chemical separations using shell and tube composite
polyphosphazene membranes. Peterson, E. S.;
 Stone, M. L.; Orme, C. J.; Reavill, D. A., III (Idaho National
 Engineering Laboratory, Idaho Falls, ID, 83415, USA). Sep. Sci.
 Technol., 30(7-9), 1573-87 (English) 1995. CODEN: SSTEDS. ISSN:
 0149-6395.
- AB Several applications of modular shell-and-tube
polyphosphazene coated membrane units are
 reported. These modules were used to measure the mixed-gas sepn.
 properties of **poly[bis(phenoxy)phosphazene]**
 based polymers on a larger scale. Transport behavior was
 detd. using the variable vol. technique. The test gas mixt. was
 SO₂/N₂ at temps. 80-270.degree.. Transport of these gases was found
 to be a sorption controlled process. Several org.-aq. and org.-org.
 sepn. have been performed using the **polyphosphazene**
 coated shell and tube modules. The sepn. include: methylene
 chloride/water, acetic acid/water, iso-Pr alc./water,
 glycerol/water, and hexane/soy oil. The membranes were
 prep'd. using slip casting techniques. The results of
 these studies show that **polyphosphazene membranes**
 can effectively be used to sep. acid gases and org. chms.
 from various waste streams in harsh, chem. aggressive environments.
- IT 28212-48-8, **Poly[bis(phenoxy)phosphazene**
]
 (chem. sepn. by permeation through shell-and-tube composite
polyphosphazene membranes)
- RN 28212-48-8 HCA
 CN Poly[nitrilo(diphenoxypyrophoranylidyne)] (8CI, 9CI) (CA INDEX
 NAME)



- CC 48-1 (Unit Operations and Processes)
 ST chem sepn composite **polyphosphazene membrane**;
 permeation sepn composite **polyphosphazene membrane**
 IT **Membranes**
 Permeability and Permeation
 (chem. sepn. by permeation through shell-and-tube composite
polyphosphazene membranes)
- IT 28212-48-8, **Poly[bis(phenoxy)phosphazene**
]
 (chem. sepn. by permeation through shell-and-tube composite

- IT polyphosphazen membran s)
 64-19-7P, Acetic acid, preparation
 (sepn. of acetic acid by permeation through shell-and-tube composite polyphosphazene membranes)
- IT 56-81-5P, Glycerol, preparation
 (sepn. of glycerol by permeation through shell-and-tube composite polyphosphazene membranes)
- IT 110-54-3P, Hexane, preparation
 (sepn. of hexane by permeation through shell-and-tube composite polyphosphazene membranes)
- IT 67-63-0P, 2-Propanol, preparation
 (sepn. of iso-Pr alc. by permeation through shell-and-tube composite polyphosphazene membranes)
- IT 75-09-2P, Methylene chloride, preparation
 (sepn. of methylene chloride by permeation through shell-and-tube composite polyphosphazene membranes)
- IT 7727-37-9P, Nitrogen, preparation
 (sepn. of nitrogen by permeation through shell-and-tube composite polyphosphazene membranes)
- IT 7446-09-5P, Sulfur oxide (SO₂), preparation
 (sepn. of sulfur dioxide by permeation through shell-and-tube composite polyphosphazene membranes)

L91 ANSWER 17 OF 26 HCA COPYRIGHT 2000 ACS

121:256907 Metal Ion-Complexing Polyphosphazene

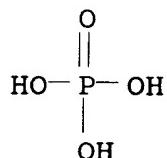
-Interpenetrating Polymer Networks. Visscher, Karyn B.; Allcock, Harry R. (Department of Chemistry, Pennsylvania State University, University Park, PA, 16802, USA). Chem. Mater., 6(11), 2040-50 (English) 1994. CODEN: CMATEX. ISSN: 0897-4756.

AB This synthesis of interpenetrating polymer networks (IPNs) composed of the polyphosphazenes [NP(OCH₂CH₂OCH₂CH₂OCH₃)₂]_n (MEEP), or [NP(OC₆H₄COOPr)₂]_n and acidic, ion-complexing org. polymers is reported. These latter polymers included poly(acrylic acid), poly(sodium vinylsulfonate), poly[bis(undecenyl phosphate)], and poly[(p-methyliminodiacetoxy)styrene]. Several of these IPN systems are capable of selective coordination of specific ions and are prototypes for ion-selective membranes. Full, sequential IPNs were prep'd., and these materials were characterized by NMR spectroscopy, DSC, and TEM. After metal complexation, the conjugate IPNs were analyzed by electron microscopy and x-ray microanal. The metal coordination was used to enhance domain contrast in these systems for electron microscopy studies. Because the IPNs based on MEEP are of particular interest for ion-selective membrane applications, the stability of MEEP in acidic, neutral, and basic aq. media and the response of the polymer to aq. salt solns. was also examd.

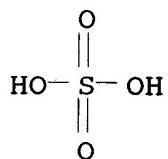
IT 7664-38-2, Phosphoric acid, uses 7664-93-9,
 Sulfuric acid, uses 7697-37-2, Nitric acid, uses
 (hydrolysis of polyphosphazen s exposed to concd.
 acids)

RN 7664-38-2 HCA

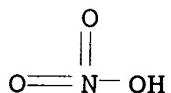
CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 7664-93-9 HCA
 CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



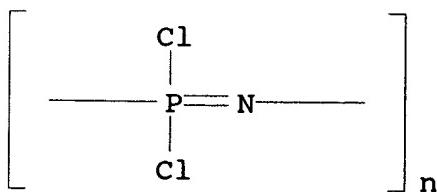
RN 7697-37-2 HCA
 CN Nitric acid (8CI, 9CI) (CA INDEX NAME)



IT 26085-02-9D, Poly(dichlorophosphazene),
 (methoxyethoxy)ethoxy- and propyloxybenzoate group-contg., metal
 complexes

(prepn. and characterization of polyphosphazene-org.
 polymer interpenetrating network metal ion-complexes)

RN 26085-02-9 HCA
 CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



CC 37-3 (Plastics Manufacture and Processing)
 ST polyphosphazene interpenetrating network metal complex;
 polyacrylic acid interpenetrating network polyphosphazene;
 polyvinylsulfonate interpenetrating network polyphosphazene;
 ; polybisundecenyl phosphate interpenetrating network

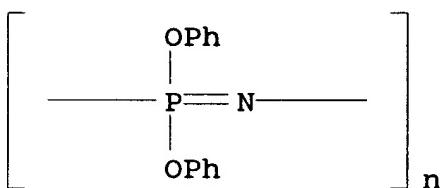
- IT **polyphosphaz n ; polymethyliminodiacetoxystyrene interpenetrating network polyphosphaz en**
Phosphaz n polym rs
 ((methoxyethoxy)ethoxy- and propyloxybenzoate group-contg., metal complexes; prepn. and characterization of **polyphosphazene**-org. polymer interpenetrating network metal ion-complexes)
- IT Glass temperature and transition
 (of **polyphosphazene**-org. polymer interpenetrating networks)
- IT Polymer morphology
 (prepn. and characterization of **polyphosphazene**-org. polymer interpenetrating network metal ion-complexes)
- IT 7647-01-0, Hydrochloric acid, uses 7664-38-2, Phosphoric acid, uses 7664-93-9, Sulfuric acid, uses 7697-37-2, Nitric acid, uses
 (hydrolysis of **polyphosphazenes** exposed to concd. acids)
- IT 7439-89-6D, Iron, complexes with **polyphosphazene**-polymer interpenetrating networks 7439-95-4D, Magnesium, complexes with **polyphosphazene**-polymer interpenetrating networks
 7439-97-6D, Mercury, complexes with **polyphosphazene**-polymer interpenetrating networks 7440-22-4D, Silver, complexes with **polyphosphazene**-polymer interpenetrating networks
 7440-50-8D, Copper, complexes with **polyphosphazene**-polymer interpenetrating networks 7440-66-6D, Zinc, complexes with **polyphosphazene**-polymer interpenetrating networks
 7440-70-2D, Calcium, complexes with **polyphosphazene**-polymer interpenetrating networks 9002-97-5D, Poly(sodium vinylsulfonate), metal complexes 9003-01-4D, Poly(acrylic acid), metal complexes 26085-02-9D, Poly(dichlorophosphazene), (methoxyethoxy)ethoxy- and propyloxybenzoate group-contg., metal complexes 30395-28-9D, metal complexes 82280-45-3D, metal complexes
 (prepn. and characterization of **polyphosphazene**-org. polymer interpenetrating network metal ion-complexes)

L91 ANSWER 18 OF 26 HCA COPYRIGHT 2000 ACS
 118:65825 Mixed-gas separation properties of phosphazene polymer membranes. Peterson, E. S.; Stone, M. L.; McCaffrey, R. R.; Cummings, D. G. (Idaho Natl. Eng. Lab., Idaho Falls, ID, 83415, USA). Sep. Sci. Technol., 28(1-3), 423-40 (English) 1993. CODEN: SSTEDS. ISSN: 0149-6395.

AB The mixed-gas sepn. properties of poly[bis(phenoxy) phosphazene] based polymers are reported. Transport behavior was detd. using the variable vol. technique. Test gases were run as mixed-gas pairs including SO₂/N, H₂S/CH₄, and CO₂/CH₄. Transport of these gases was a sorption controlled process since these gases significantly deviated from the diffusion controlled permeability-size correlation. Membranes were prep'd. using soln. casting techniques. Solvent evapn. rate during the casting and subsequent curing processes was controlled to provide a consistent membran

microstructure. Polyphosphazene membranes can effectively be used to sep. acid gases from various aggressive waste streams.

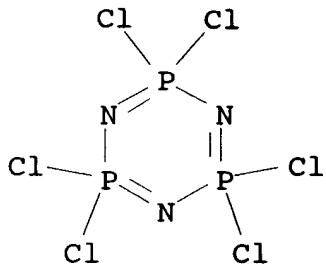
IT 28212-48-8, Poly[bis(phenoxy)phosphazene]
]
 (membrane, for mixed gas sepn., waste gas treatment)
 RN 28212-48-8 HCA
 CN Poly[nitrilo(diphenoxypyrophoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



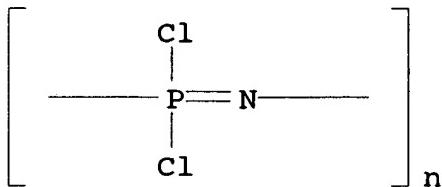
CC 59-4 (Air Pollution and Industrial Hygiene)
 Section cross-reference(s): 38
 ST phosphazene polymer membrane gas sepn
 IT Waste gases
 (acid gas sepn. from, polyphosphazene
 membranes for)
 IT Membranes
 (phosphazene polymers, for sepn. of gases,
 waste gas treatment in relation to)
 IT Phosphazene polymers
 (bis(carboxyphenoxy), membrane, for mixed gas sepn.,
 waste gas treatment)
 IT Phosphazene polymers
 (bis(fluorophenoxy), membrane, for mixed gas sepn., in
 waste gas treatment)
 IT Phosphazene polymers
 (bis(methylphenoxy), membrane, for mixed gas sepn., in
 waste gas treatment)
 IT Phosphazene polymers
 (bis(sulfophenoxy), membrane, for mixed gas sepn., in
 waste gas treatment)
 IT 28212-48-8, Poly[bis(phenoxy)phosphazene]
]
 (membrane, for mixed gas sepn., waste gas treatment)
 IT 74-82-8, Methane, miscellaneous
 (sepn. of, from hydrogen sulfide and carbon dioxide,
 polyphosphazene membranes for)
 IT 124-38-9, Carbon dioxide, miscellaneous 7783-06-4, Hydrogen
 sulfide, miscellaneous
 (sepn. of, from methane, polyphosphazene
 membranes for)
 IT 7446-09-5, Sulfur dioxide, miscellaneous
 (sepn. of, from nitrogen, polyphosphazene

- membran s for)
IT 7727-37-9, Nitrogen, miscellaneous
(sepn. of, from sulfur dioxide, polyphosphazene
membranes for)
- L91 ANSWER 19 OF 26 HCA COPYRIGHT 2000 ACS
115:280878 Ionically crosslinkable poly[bis(carboxyphenoxy) phosphazene] and its hydrogels and membranes.
Allcock, Harry-R.; Kwon, Sukky (Pennsylvania Research Corp., USA).
U.S. US 5053451 A 19911001, 7 pp. (English). CODEN: USXXAM.
APPLICATION: US 1990-467821 19900119.
- AB The title polymer (I) with d.p. 8000 and the corresponding cyclic trimer are prep'd. by reaction of poly(dichlorophosphazene) and hexachlorocyclotriphosphazene, resp., with p-NaOC₆H₄CO₂Et and hydrolysis of the intermediate with tert-BuOK. A DMSO soln. of I was cast to give a film that was crosslinked and aq. CuSO₄, and solns. of I and Na₂CO₃ solns. were crosslinked to gels by CaCl₂, CuCl₂, CuBr₂, and Al(OAc)₃.
- IT 25231-98-5DP, Hexachlorocyclotriphosphazene homopolymer, carboxyphenoxy derivs. 26085-02-9DP,
Poly(dichlorophosphazene), carboxyphenoxy derivs.
(manuf. of ionically crosslinkable)
- RN 25231-98-5 HCA
CN 1,3,5,2,4,6-Triazatrichosphorine, 2,2,4,4,6,6-hexachloro-2,2,4,4,6,6-hexahydro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 940-71-6
CMF Cl6 N3 P3

- RN 26085-02-9 HCA
CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



IC ICM C08G079-04
 NCL 524600000
 CC 35-8 (Chemistry of Synthetic High Polymers)
 Section cross-reference(s): 37
 IT Phosphazene polymers
 (carboxyphenoxy derivs., manuf. of ionically crosslinkable)
 IT Crosslinking agents
 (di- or trivalent metal salts, for poly
 [bis(carboxyphenoxy)phosphazene])
 IT 139-12-8, Aluminum acetate 7447-39-4, Cupric chloride, uses and
 miscellaneous 7758-98-7, Sulfuric acid copper(2+) salt
 (1:1), uses and miscellaneous 7789-45-9, Cupric bromide
 10043-52-4, Calcium chloride, uses and miscellaneous
 (crosslinking agents, for poly[bis(carboxyphenoxy)
 phosphazene])
 IT 25231-98-5DP, Hexachlorocyclotriphosphazene homopolymer,
 carboxyphenoxy derivs. 26085-02-9DP,
 Poly(dichlorophosphazene), carboxyphenoxy derivs.
 (manuf. of ionically crosslinkable)

L91 ANSWER 20 OF 26 HCA COPYRIGHT 2000 ACS
 113:117526 Preparation of ion-conducting membranes. Yasuda,
 Ayumi; Yamaga, Noriyuki (Matsushita Electric Works, Ltd., Japan).
 Jpn. Kokai Tokkyo Koho JP 01309213 A2 19891213 Heisei, 6 pp.
 (Japanese). CODEN: JKXXAF. APPLICATION: JP 1988-101877 19880425.
 PRIORITY: JP 1987-312623 19871210.

AB The title membranes for secondary battery or electrode
 materials are prep'd. by evapg. a perfluorosulfonate polymer soln. to
 obtain a solid polymer, immersing the solid polymer into an aq.
 soln. or acid contg. the desired cations (e.g., H and/or alkali
 metal ions) to form a perfluorosulfonic acid polymer soln., and then
 casting the perfluorosulfonic acid polymer soln. onto a
 glass plate. Thus, a 5 wt.% Nafion soln. was evapd. at 50.degree.
 and 10 torr to give a solid polymer, which was then immersed
 repeatedly in 1N H₂SO₄ for 1 h to exchange cations and to
 obtain a perfluorosulfonic acid polymer soln., followed by
 casting onto a glass plate to produce a H⁺-
 conducting membrane with thickness .apprx.1 .mu.m.

IC ICM H01B013-00
 ICS B01J047-12; B05D007-24; C08L027-12; H01G009-00; H01M010-40
 CC 47-2 (Apparatus and Plant Equipment)
 Section cross-reference(s): 72
 ST ion conducting membran electrode; perfluorosulfonic acid

IT polymer membrane
 IT Batteries, secondary
 Electrodes
 (ion-conducting membranes for, from perfluorosulfonic acid polymers)
 IT Membranes
 (perfluorosulfonic acid polymers, ion-conducting, manuf. of)
 IT Cation exchangers
 (membranes, casting of Nafion)
 IT Sulfonic acids, polymers
 (perfluoro, polymers, ion-conducting membranes from)

L91 ANSWER 21 OF 26 HCA COPYRIGHT 2000 ACS

112:186478 Ion and solvent transport in ion-exchange membranes

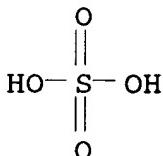
. II. A radiotracer study of the sulfuric-acid, Nafion-117 system.
 Verbrugge, Mark W.; Hill, Robert F. (Phys. Chem. Dep., Gen. Mot. Res. Lab., Warren, MI, 48090-9055, USA). J. Electrochem. Soc., 137(3), 893-9 (English) 1990. CODEN: JESOAN. ISSN: 0013-4651.

AB Radiotracer techniques are developed to measure the H⁺ and HSO₄⁻ ion diffusion coeffs. in Nafion 117 membranes contg. aq. H₂SO₄. The ³⁵S isotope was used to mimic the more-abundant, naturally occurring ³²S in obtaining the HSO₄⁻ diffusion coeff. In a novel development, the H⁺ diffusion coeff. was obtained by also utilizing ³⁵S transport rates. A single, concn.-independent diffusion coeff. is found to represent accurately HSO₄⁻ transport over concns. ranging from 0.003-1.0M H₂SO₄; this lends substantial support to understanding of the phenomena occurring within these membranes. A Bruggeman-type relation (which incorporates structural information of a porous medium so as to relate the diffusion coeffs. within the porous phase to those of a free soln.) is shown to represent surprisingly well the HSO₄⁻ diffusion coeff., which casts doubt on previously proposed structure theories for this class of materials. These results indicate that the membrane pores are of approx. uniform cross-sectional area and 60 .ANG. in breadth.

IT 7664-93-9, Sulfuric acid, properties
 (diffusion coeffs. of ions in Nafion 117 membrane in contact with aq.)

RN 7664-93-9 HCA

CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



CC 66-4 (Surface Chemistry and Colloids)

Section cross-reference(s): 72

ST ion exchanger m mbran bisulfate diffusion; sulfur 35

IT tracer ion diffusion; sulfuric acid Nafion 117 membran
 Diffusion
 (of bisulfate and hydrogen ions, in Nafion 117 membranes
 , radiotracer study of)
 IT 7664-93-9, Sulfuric acid, properties
 (diffusion coeffs. of ions in Nafion 117 membrane in
 contact with aq.)
 IT 12408-02-5, Hydrogen ion, properties 14996-02-2, Sulfate
 (HSO_4^-), properties
 (diffusion coeffs. of, in Nafion 117 membranes
)
 IT 66796-30-3, Nafion 117
 (membranes, bisulfate and hydrogen ion
 diffusion in)

L91 ANSWER 22 OF 26 HCA COPYRIGHT 2000 ACS
 111:98655 Preparation of multilayer permselective membranes.
 Nakamura, Hide; Yamamoto, Hirotugu; Takahashi, Kazuhiro (Asahi
 Glass Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 01030620 A2
 19890201 Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
 1987-186689 19870728.

AB The title membranes are prep'd. by laminating porous
 substrates and highly permeable middle layers (e.g., siloxanes,
 polyphosphazenes, polysilylacetylenes), exposing the middle
 layers to UV light, coating with dispersions of polymers promoting
 gas sepn., and drying. A $\text{C}_2\text{Cl}_3\text{F}_3$ soln. of di-Me siloxane was cast
 on a nonwoven polyester-reinforced polysulfone, dried, exposed to
 UV, dipped in a $\text{C}_2\text{Cl}_3\text{F}_3$ soln. of 100:1 poly(vinyl pivalate)-Blemmer
 PE350, and dried to give a membrane with O permeability
 0.45 $\text{m}^3/\text{m}^2\text{-h-atm}$ and O-N sepn. index 3.9; vs. 0.96 and 2.3, resp.,
 without UV irradn.

IT 9002-84-0
 (porous, laminates with siloxanes or polyphosphazenes,
 for permselective membranes)

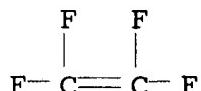
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



IC ICM B01D053-22
 CC 38-3 (Plastics Fabrication and Uses)
 ST polyvinyl pivalate m mbran permselective; siloxane
 membran permselective; oxygen sepn air m mbrane;

- IT membran permselective composite; polysulfone
membran permselective
- IT Polyamides, uses and miscellaneous
Polyesters, uses and miscellaneous
Polyimides, uses and miscellaneous
Polysulfones, uses and miscellaneous
(porous, laminates with siloxanes or **polyphosphazenes**,
for permselective membranes)
- IT Siloxanes and Silicones, uses and miscellaneous
(amino-contg., UV-irradiated, in composite permselective
membranes)
- IT Siloxanes and Silicones, uses and miscellaneous
(di-Me, UV-irradiated, in composite permselective
membranes)
- IT **Phosphazene polymers**
(fluoroalkoxy, UV-irradiated, in composite permselective
membranes)
- IT **Membranes**
(permselective, composite, for gas sepn.)
- IT Polysulfones, uses and miscellaneous
(polyether-, porous, laminates with siloxanes or
polyphosphazenes, for permselective membranes)
- IT Polyethers, uses and miscellaneous
(polysulfone-, porous, laminates with siloxanes or
polyphosphazenes, for permselective membranes)
- IT Glass, oxide
(porous, laminates with siloxanes or **polyphosphazenes**,
for permselective membranes)
- IT 9016-80-2 25736-86-1, Blemmer PE350 26715-88-8 87842-32-8
120693-09-6 122374-98-5 122374-99-6
(laminates with siloxanes or **polyphosphazenes**, for
permselective membranes)
- IT **9002-84-0** 9003-07-0 9004-34-6D, Cellulose, esters
24937-79-9, Poly(vinylidene fluoride) 25014-41-9
(porous, laminates with siloxanes or **polyphosphazenes**,
for permselective membranes)

L91 ANSWER 23 OF 26 HCA COPYRIGHT 2000 ACS
108:188070 Water-insoluble proton-conducting
membranes. Zupancic, Joseph J.; Swedo, Raymond J.;
Petty-Weeks, Sandra (UOP Inc., USA). U.S. US 4708981 A 19871124, 7
pp. (English). CODEN: USXXAM. APPLICATION: US 1985-807727
19851211.

AB Title **membranes**, useful for gas sepg. and sensing,
comprise interpenetrating networks of a host compn. contg.
H₂SO₄ or **H₃PO₄** and polymers from unsatd. compds.,
ethylene oxide, ethylenimine, or phenol-HCHO mixts., and a guest
polymer formed from a monofunctional acrylic monomer different from
that of the host polymer and difunctional acrylic crosslinking
agents. Thus, solns. of 0.5 g poly(vinyl alc.) and 0.2 mL 85%
H₃PO₄, and 2 g methylenebisacrylamide and 30.1 g methacrylic
acid were prep'd. in 25 mL boiling water and water, resp. Mixing 6.7

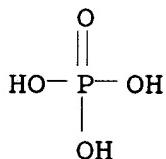
mL and 10 mL of each soln., pouring into a polycarbonate Petridish, drying and irradiating with electron beam gave a m mbran . Cutting the membran into disk, sputter-depositing Pt electrodes on both sides of the disk, assembling this membrane onto a Teflon holder, and connecting with electricity through Cu platens while maintaining 1 atm. H pressure on 1 side and exposing the other side to a mixt. of 10% H and 90% N for 24 h showed an output emf. (EMF) 29.2 mV and resistivity 2.0 .times. 106 .OMEGA.-cm. This was compared to an output EMF 0.1 mV when 100% H was present on both sides of the membrane.

IT 7664-38-2, uses and miscellaneous 7664-93-9, uses and miscellaneous

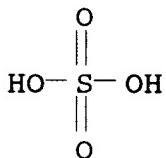
(membranes contg., interpenetrating-polymer blend-based, proton-conducting water-insol., for gas sepg. and sensing)

RN 7664-38-2 HCA

CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 7664-93-9 HCA
CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



IC ICM C08L029-04

ICS C08L033-02; C08L041-00; C08L043-02

NCL 525059000

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 72

ST membrane gas sepn; sensor gas membrane; hydrogen sensor membrane; permselective membrane
proton conducting polymer; electrolyte thin film
gas sepn; polyvinyl alc membrane gas sensor; phosphoric acid membrane gas sensor; acrylamide polymer
membrane gas sensor

IT Membran s

(permselective, for gas sepg. and sensing, interpenetrating polymer blends for, water-insol., proton-conducting)

- IT 7664-38-2, uses and miscellaneous 7664-93-9, uses and miscellaneous
 (membran s contg., interpenetrating-polymer blend-based, proton-conducting water-insol., for gas sepg. and sensing)
- IT 25034-58-6 30280-72-9, Acrylic acid-methylenebisacrylamide copolymer 30421-16-0, Methacrylic acid-methylenebisacrylamide copolymer 114239-64-4, N,N-Diallylacrylamide-methacrylic acid copolymer
 (permselective membrane composites contg. acid-modified polymer and, water-insol., proton-conducting, for gas sepg. and sensing)
- IT 9002-89-5, Poly(vinyl alcohol) 9002-98-6 9003-01-4, Poly(acrylic acid) 9003-05-8, Poly(acrylamide) 9003-35-4, Formaldehyde-phenol copolymer 25014-15-7, Poly(2-vinylpyridine) 25087-26-7, Poly(methacrylic acid) 25232-41-1, Poly(4-vinylpyridine) 25232-42-2, Poly(N-vinylimidazole) 25322-68-3, Poly(ethylene oxide) 25805-17-8, Poly(2-ethyl-2-oxazoline) 26101-52-0, Poly(vinyl sulfonic acid)
 (permselective membrane composites contg. crosslinked polymers and acid-modified, water-insol. and proton-conducting, for gas sepg. and sensing)

L91 ANSWER 24 OF 26 HCA COPYRIGHT 2000 ACS

107:66556 Electrochemical cells and method of measuring the partial pressure borne by the cells. Jeanne, Francis; Schmidt, Emmanuel; Lombard, Serge (Air Liquide, Societe Anon. pour l'Etude et l'Exploitation des Procedes Georges Claude, Fr.). Fr. Demande FR 2583066 A1 19861212, 34 pp. (French). CODEN: FRXXBL. APPLICATION: FR 1985-8691 19850607.

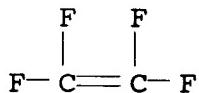
AB The title cells selectively transport O₂, a current of O₂⁻, which moves in a polymer matrix inert to O₂⁻; the cells are useful for O₂ sepn. and partial pressure measurement. The O₂⁻ source is preferably an alkali metal superoxide (e.g., NaO₂) or a tetraalkylammonium superoxide (e.g., Me₄NO₂). The inert polymer matrix comprises a compn. selected from polyalkylene oxide (e.g., polypropylene oxide and polyethylene oxide), polyamides, polyphosphazenes, polyalkylenimines, fluoropolymers, and quaternary ammonium compd. resins. A cell with an electrolyte contg. polyethylene oxide 4, polypropylene oxide 2, (C₆H₁₃)₄NClO₄ 1, and Bu₄NO₂ 3 wt. parts was operated at 20.degree., with the electrolyte in the form of a disk membrane of surface area 3 cm² and thickness 150 .mu.m. The membrane was pressed between 2 conductive C disks, which had Au-coated stainless steel contacts. The cell measured an O₂ potential of 39 .+-. 1 mV for O₂ in a mixt. of N₂ 78.91 and O₂ 21.09% at a total pressure of 1 bar.

IT 9002-84-0, PTFE
 (in superoxide-conducting electrochem. cell for oxygen sepn. and partial pressure measurement)

RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3
CMF C2 F4

IC ICM C25B001-02
 CC 72-3 (Electrochemistry)
 Section cross-reference(s): 38, 76, 79
 IT Phosphazene polymers
 Polyamides, uses and miscellaneous
 Polyamines
 Polyoxyalkylenes, uses and miscellaneous
 (polymer matrix contg., for superoxide-conducting
 electrochem. cell for oxygen sep. and partial pressure
 measurement)
 IT 9002-84-0, PTFE
 (in superoxide-conducting electrochem. cell for oxygen sep. and
 partial pressure measurement)

L91 ANSWER 25 OF 26 HCA COPYRIGHT 2000 ACS

107:66555 Process for selective oxygen transfer and its application in oxygen production and partial pressure measurement. Jeanne, Francis; Schmidt, Emmanuel; Lombard, Serge (Air Liquide, Societe Anon. pour l'Etude et l'Exploitation des Procedes Georges Claude, Fr.). Fr. Demande FR 2583067 A1 19861212, 37 pp. (French). CODEN: FRXXBL. APPLICATION: FR 1985-8692 19850607.

AB The title cells selectively transport O₂, a current of O₂⁻, which moves in a polymer matrix inert to O₂⁻; the cells are useful for O₂ sep. and partial pressure measurement. The O₂⁻ source is preferably an alkali metal superoxide (e.g., NaO₂) or a tetraalkylammonium superoxide (e.g., Me₄NO₂). The inert polymer matrix comprises a compn. selected from polyalkylene oxide (e.g., polypropylene oxide and polyethylene oxide), polyamides, polyphosphazenes, polyalkyleneimines, fluoropolymers, and quaternary ammonium compd. resins. A cell with an electrolyte contg. polyethylene oxide 4, polypropylene oxide 2, (C₆H₁₃)₄NClO₄ 1, and Bu₄NO₂ 3 wt. parts was operated at 20.degree., with the electrolyte in the form of a disk membrane surface area 3 cm² and thickness 150 .mu.m. The membrane was pressed between 2 conductive C disks, which had Au-coated stainless steel contacts. The cell measured an O₂ potential of 39 .+-. 1 mV for O₂ in a mixt. of N₂ 78.91 and O₂ 21.09% at a total pressure of 1 bar.

IT 9002-84-0, PTFE
 (in superoxide-conducting electrochem. cell for oxygen sep. and
 partial pressure measurement)

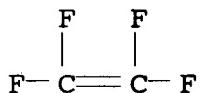
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



IC ICM C25B001-02

CC 72-3 (Electrochemistry)

Section cross-reference(s): 38, 76, 79

IT Phosphazene polymers

Polyamides, uses and miscellaneous

Polyamines

Polyoxalkylenes, uses and miscellaneous

(polymer matrix contg., for superoxide-conducting
electrochem. cell for oxygen sepn. and partial pressure
measurement)

IT 9002-84-0, PTFE

(in superoxide-conducting electrochem. cell for oxygen sepn. and
partial pressure measurement)

L91 ANSWER 26 OF 26 HCA COPYRIGHT 2000 ACS

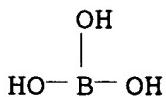
88:174691 Contribution to the study of cathodic hydrogen diffusion in
Armco iron. Part II. Effect of temperature and strain on cathodic
hydrogen diffusion in Armco iron. Chene, Jacques (Inst. Phys., Ec.
Cent. Arts Mfg., Chatenay-Malabry, Fr.). Met.: Corros.-Ind.,
52(623-624), 262-79 (French) 1977. CODEN: MTUXAS. ISSN: 0026-1084.

AB Microg. studies of ferritic structures confirm the fact that
differences do arise in such structures as a function of
casting conditions. Such differences are useful in detg.
the exact influence of cathodic H diffusion and, along with
dilatometric studies, define suitable annealing temps. and optimum
grain size, and det. the mech. characteristics of Armco Fe. The
method utilizes a modified Barrer diffusion technique of
diffusing H across a metallic membrane
at a measured rate. The electrolytic cell supplying the H was
maintained at carefully controlled temps., enabling the detn. of a
series of characteristic diffusion coeffs. In addn. to temp.
(0-100.degree.) and choice of electrolyte (HCl and H₂SO₄
are preferred), the method of charging, c.d. (3.5 mA/cm² is an
optimum value), and membrane thickness (0.2 cm optimum
value) are significant factors. An interstitial diffusion mechanism
is confirmed, but the diffusion pattern is highly distorted by the
surface entrapment of H mols.

CC 55-8 (Ferrous Metals and Alloys)

=> d 194 1-12 cbib abs hitstr hitind

- L94 ANSWER 1 OF 12 HCA COPYRIGHT 2000 ACS
 131:118499 Modular ceramic electrochemical cells for
 fuel cells and oxygen generators. Crome, Victor
 Paul; Hart, Russell Frank; Sehlin, Scott Richard (Litton Systems,
 Inc., USA). Eur. Pat. Appl. EP 932214 A2 19990728, 20 pp.
 DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI,
 LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN:
 EPXXDW. APPLICATION: EP 1998-116597 19980902. PRIORITY: US
 1998-10828 19980122.
- AB A ceramic electrolyte element is described which can be injection molded from an electrolyte and a binder. The ceramic element consists of a tube support and a plurality of tubes extending from the tube support. The tubes are arranged in rows and columns. A plurality of vias extend from one surface of the tube support to an opposite surface of the support. The ceramic element is coated with an elec. conductive coating and then with a current collector coating. The vias are coated with the elec. conductive coating and plugged. After the coatings are removed in selected areas of the ceramic element, the tubes of the ceramic element form a series-parallel array because tubes in the same column are connected in parallel elec. and tubes in adjacent rows are connected in series elec. Two ceramic elements are sealed together to form a modular electrochem. cell. The electrochem. cell can be used in an oxygen generator or a fuel cell. Oxygen generating capacity can be increased by manifolding together two or more modular oxygen generators.
- IT 10043-35-3, Boric acid, uses
 (binder; modular ceramic electrochem. cells for
 fuel cells and oxygen generators)
- RN 10043-35-3 HCA
- CN Boric acid (H₃BO₃) (6CI, 8CI, 9CI) (CA INDEX NAME)



- IC ICM H01M008-24
 ICS H01M008-12; H01M008-02; B01D053-32
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 49, 57, 76
- ST electrochem cell ceramic modular; oxygen generator modular ceramic
 electrochem cell; fuel cell modular ceramic
 electrochem cell
- IT Beeswax
 (binder; modular ceramic electrochem. cells for
 fuel cells and oxygen generators)

- IT Carnauba wax
 Hydrocarbon oils
 Paraffin waxes, uses
 Peanut oil
 Polyoxyalkylenes, uses
 Polyoxymethylenes, uses
 (binder; modular ceramic electrochem. cells for
 fuel cells and oxygen generators)
- IT Solid electrolytes
 (ceramic, molded; modular ceramic electrochem.
 cells for fuel cells and oxygen
 generators)
- IT Hydrocarbon waxes, uses
 (microcryst., binder; modular ceramic electrochem. cells
 for fuel cells and oxygen generators)
- IT Electrochemical cells
 Fuel cells
 (modular ceramic electrochem. cells for fuel
 cells and oxygen generators)
- IT Gas generators
 (oxygen; modular ceramic electrochem. cells for
 fuel cells and oxygen generators)
- IT Fats and Glyceridic oils, uses
 (vegetable, binder; modular ceramic electrochem. cells
 for fuel cells and oxygen generators)
- IT 56-81-5, 1,2,3-Propanetriol, uses 57-11-4, Octadecanoic acid, uses
 112-80-1, 9-Octadecenoic acid (9Z)-, uses 9002-18-0, Agar
 9002-86-2, Polyvinyl chloride 9002-88-4, Polyethylene 9002-89-5,
 Polyvinyl alcohol 9003-07-0, Polypropylene 9003-53-6,
 Polystyrene 9004-67-5, Methylcellulose 10043-35-3, Boric
 acid, uses 24937-78-8, Ethylene vinyl acetate copolymer
 25322-68-3
 (binder; modular ceramic electrochem. cells for
 fuel cells and oxygen generators)
- IT 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7440-22-4,
 Silver, uses 7440-57-5, Gold, uses 11106-95-9 12735-99-8
 37206-56-7
 (current collector; modular ceramic electrochem. cells
 for fuel cells and oxygen generators)
- IT 108916-22-9, Lanthanum manganese strontium oxide La_{0.8}MnSr_{0.2}O₃
 113514-55-9, Calcium lanthanum manganese oxide (Ca,La)MnO₃
 126447-16-3, Lanthanum manganese strontium oxide (La,Sr)MnO₃
 148792-94-3, Barium lanthanum manganese oxide (Ba,La)MnO₃
 175865-42-6, Cobalt iron lanthanum strontium oxide
 ((Co,Fe)(La,Sr)O₃)
 (electrode; modular ceramic electrochem. cells for
 fuel cells and oxygen generators)
- IT 106390-23-2, Bismuth yttrium oxide Bi_{1.6}Y_{0.4}O₃ 108706-39-4,
 Bismuth yttrium oxide (Bi,Y)O₃ 122643-22-5, Bismuth gadolinium
 oxide ((Bi,Gd)O₃) 131600-18-5, Bismuth copper vanadium oxide
 Bi₂CuO_{1.9} 136854-58-5, Cerium gadolinium oxide
 Ce_{0.8}Gd_{0.2}O₃ 143299-54-1, Yttrium zirconium oxide Y_{0.08}Zr_{0.92}O₃

151532-01-3, Bismuth erbium oxide (Bi,Er)2O3 152144-82-6, Bismuth dysprosium oxide (Bi,Dy)2O3 153746-70-4, Bismuth vanadium zirconium oxide 155343-26-3 157911-41-6, Bismuth copper vanadium oxide 163294-91-5, Cerium lanthanum oxide (Ce,La)O2 168045-09-8, Bismuth cobalt vanadium oxide 176205-22-4, Bismuth titanium vanadium oxide 189288-21-9, Yttrium zirconium oxide (Y,Zr)O2 226564-04-1, Cerium yttrium oxide (Ce,Y)O2 233280-39-2, Ytterbium zirconium oxide ((Yb,Zr)O2) 233280-40-5, Scandium zirconium oxide ((Sc,Zr)O2) 233280-41-6, Calcium zirconium oxide ((Ca,Zr)O2) 233280-42-7, Magnesium zirconium oxide ((Mg,Zr)O2) 233280-43-8, Cerium samarium oxide ((Ce,Sm)O2) 233280-44-9, Cerium gadolinium oxide ((Ce,Gd)O2) 233280-45-0, Cerium strontium oxide ((Ce,Sr)O2) 233280-46-1, Bismuth neodymium oxide ((Bi,Nd)2O3) 233280-47-2, Bismuth lanthanum oxide ((Bi,La)2O3) 233280-48-3, Aluminum bismuth vanadium oxide 233280-49-4, Bismuth nickel vanadium oxide 233280-50-7

(electrolyte; modular ceramic electrochem. cells for fuel cells and oxygen generators)

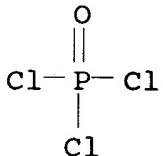
IT 7782-44-7P, Oxygen, preparation
(modular ceramic electrochem. cells for fuel cells and oxygen generators)

L94 ANSWER 2 OF 12 HCA COPYRIGHT 2000 ACS

130:5643 High efficiency polycrystalline silicon solar cells using low temperature PECVD process. Elgamel, Hussam Eldin A. (Faculty of Engineering, Cairo University, Cairo, Egypt). IEEE Trans. Electron Devices, 45(10), 2131-2137 (English) 1998. CODEN: IETDAI. ISSN: 0018-9383. Publisher: Institute of Electrical and Electronics Engineers.

AB Conventionally directionally solidified (DS) and silicon film (SF) polycryst. silicon solar cells are fabricated using gettering and low temp. plasma enhanced chem. vapor deposition (PECVD) passivation. Thin layer (.apprx.10 nm) of PECVD SiO₂ is used to passivate the emitter of the solar cell, while direct hydrogen rf plasma and PECVD Si₃N₄ are implemented to provide emitter and bulk passivation. It is found in this work that hydrogen rf plasma can significantly improve the solar cell blue and long wavelength responses when it is performed through a thin layer of PECVD Si₃N₄. High efficiency DS and SF polycryst. silicon solar cells have been achieved using a simple solar cell process with uniform emitter, Al/POCl₃ gettering, hydrogen rf plasma/PECVD Si₃N₄ and PECVD SiO₂ passivation. On the other hand, a comprehensive exptl. study of the characteristics of the PECVD Si₃N₄ layer and its role in improving the efficiency of polycryst. silicon solar cells is carried out in this paper. For the polycryst. silicon used in this investigation, it is found that the PECVD Si₃N₄ layer doesn't provide a sufficient cap for the out diffusion of hydrogen at temps. higher than 500.degree.. Low temp. (.ltoreq. 400.degree.) annealing of the PECVD Si₃N₄ provides efficient hydrogen bulk passivation, while higher temp. annealing relaxes the deposition induced stress and improves mainly the short wavelength (blue) response of the solar cells.

IT 10025-87-3, Phosphorus oxychlorid
 (gettering ambient; high efficiency polycryst. silicon solar
 cells using low temp. plasma enhanced CVD process)
 RN 10025-87-3 HCA
 CN Phosphoric trichloride (9CI) (CA INDEX NAME)

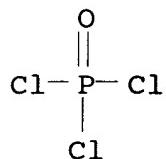


CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 IT 10025-87-3, Phosphorus oxychloride
 (gettering ambient; high efficiency polycryst. silicon solar
 cells using low temp. plasma enhanced CVD process)

L94 ANSWER 3 OF 12 HCA COPYRIGHT 2000 ACS
 129:56410 High-efficiency polycrystalline silicon film solar cells.
 Elgamel, Hussam Eldin A. (Faculty of Engineering, Cairo
 University-Fayoum Campus, Egypt). Sol. Energy Mater. Sol. Cells,
 53(3-4), 269-275 (English) 1998. CODEN: SEMCEQ. ISSN: 0927-0248.
 Publisher: Elsevier Science B.V..

AB High-efficiency polycryst. silicon film solar cells are fabricated using gettering and low-temp. plasma-enhanced chem. vapor deposition (PECVD) passivation schemes. Thin layers (.apprx.10 nm) of PECVD SiO₂ are used to passivate the emitter of the solar cell, while direct hydrogen radio-frequency plasma and PECVD Si₃N₄ are implemented to provide emitter and bulk passivation of the cells. The combination of Al and POCl₃ gettering is found to be very effective in improving the minority carrier diffusion length of the polycryst. silicon film wafers and consequently, the efficiency of the solar cells. It is shown in this work that hydrogen radio-frequency plasma treatments can significantly improve the blue and long wavelength responses of the solar cells when performed through a thin layer of PECVD Si₃N₄. A very high efficiency of 15.2% on 1 cm² area has been achieved for Si-supported film using a simple solar cell process with Al/POCl₃ gettering and low-temp. passivation.

IT 10025-87-3, Phosphoric trichloride
 (gettering; in fabrication of high-efficiency polycryst. silicon
 film solar cells)
 RN 10025-87-3 HCA
 CN Phosphoric trichloride (9CI) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 IT 7429-90-5, Aluminum, processes 10025-87-3, Phosphoric
 trichloride
 (gettering; in fabrication of high-efficiency polycryst. silicon
 film solar cells)

L94 ANSWER 4 OF 12 HCA COPYRIGHT 2000 ACS
 127:304290 Antimicrobial agent and method for its production with silver compound. Nakajima, Akio; Okayama, Hiroyuki; Ogawa, Takashi; Tanaka, Shuichi; Matsumoto, Akiteru; Moriya, Masafumi (Miyoshi Oil and Fat Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 09249511 A2 19970922 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1996-84721 19960313.

AB An antimicrobial agent has a silver coat formed by calcining after adhesion of a powd. silver compd. on a support surface. Thus, 1toreq.10-.mu. zeolite particles 100 and silver oxide powder 5 parts by wt. were mixed, and after adhesion the mixt. was calcined at 400.degree. for 8 h. The antimicrobial agent (2 g) was kneaded into 100 g of ABS resin, which was then molded into a plate. When the plate was immersed in an Escherichia coli soln. (200 g, initially 5 .times. 105 cells/mL) and shaken, there were no viable cells after 24 h.

IT 1343-98-2, Silicic acid
 (powder; antimicrobial produced by adhering silver compd. on support and calcining)

RN 1343-98-2 HCA

CN Silicic acid (8CI, 9CI) (CA INDEX NAME)

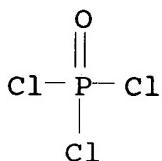
*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IC ICM A01N059-16
 ICS A01N025-08; A01N025-26
 CC 5-2 (Agrochemical Bioregulators)
 Section cross-reference(s): 42

IT 1343-98-2, Silicic acid
 (powder; antimicrobial produced by adhering silver compd. on support and calcining)

L94 ANSWER 5 OF 12 HCA COPYRIGHT 2000 ACS
 126:246484 The cytotoxicity of adenosine 5'-[N,N-di-(.gamma.-o-carboranyl)propyl]phosphorodiamidate in human Tmolt3 leukemic cells. Hall, Iris H.; Elkins, Amy L.; Sood, Anup; Tomasz, Jeno; Spielvogel, Bernard F. (Sch. Pharm., Univ. North Carolina, Chapel Hill, NC, 27599-7360, USA). Anticancer Res., 17(1A), 151-156 (English) 1997. CODEN: ANTRD4. ISSN: 0250-7005. Publisher: Anticancer Research.

- AB The title compd. was synthesized and characterized. It demonstrated potent in vivo antineoplastic activity and in vitro cytotoxicity in murine and human leukemia (Tmolt3) and uterine carcinoma tumor cell lines. In human T cell leukemia, DNA formation was preferentially inhibited, with key enzymes in the purine pathway being effectively inhibited. Marginal inhibition of the activities of DNA polymerase .alpha., carbamyl phosphate synthetase, nucleoside kinases, and thymidylate synthetase was obsd. DNA strand scission was obsd. in Tmolt3 cells after 24-h incubation with the substance.
- IT 10025-87-3, Phosphoric trichloride
(reaction of adenosine, phosphorous oxychloride,
carboranylpropylamine, and diisopropylethylamine)
- RN 10025-87-3 HCA
- CN Phosphoric trichloride (9CI) (CA INDEX NAME)

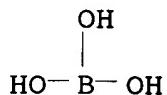


- CC 1-6 (Pharmacology)
- IT 58-61-7, Adenosine, reactions 7087-68-5, N,N-Diisopropylethylamine
10025-87-3, Phosphoric trichloride 140662-87-9
(reaction of adenosine, phosphorous oxychloride,
carboranylpropylamine, and diisopropylethylamine)

- L94 ANSWER 6 OF 12 HCA COPYRIGHT 2000 ACS
- 123:88393 Electrode substrates for batteries and fuel cells and their manufacture. Yoneyama, Hiroaki (Mitsubishi Rayon Co, Japan). Jpn. Kokai Tokkyo Koho JP 07105955 A2 19950421 Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1993-246973 19931001.

- AB The substrates are composites of carbon or graphite fibers and a carbonaceous material, where the fibers, and optionally the carbonaceous material, contain 0.01-5.0% B or B compds. The substrates are prep'd. by kneading B-contg. carbon or graphite short fibers, B or B compds, a thermosetting resin, a pore controlling agent, and an appropriate amt. of water or org. solvent, molding the mixt., removing the solvent, hardening by heating under pressing, and heat treating at ≥ 1000 .degree. in an inert atm.; or by impregnating carbon or graphite fiber sheets in a soln. of the thermosetting resin contg. B or a B compd., removing the solvent, laminating the sheets, and heat treating at ≥ 1000 .degree. in an inert atm.
- IT 10043-35-3, Orthoboric acid, uses
(manuf. of B-contg. carbon fiber-carbon electrode substrates for batteries and fuel cells)
- RN 10043-35-3 HCA

CN Boric acid (H₃BO₃) (6CI, 8CI, 9CI) (CA INDEX NAME)

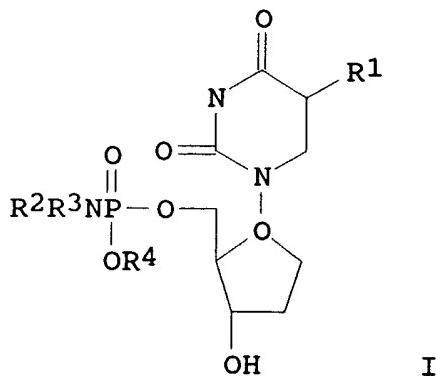


- IC ICM H01M004-88
 ICS C25B011-12; H01M004-02; H01M004-04; H01M004-66; H01M004-86;
 H01M010-39
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST battery electrode carbon substrate boron; fuel
 cell electrode substrate
- IT Carbon fibers, uses
 (manuf. of B-contg. carbon fiber-carbon electrode substrates for
 batteries and fuel cells)
- IT Electrodes
 (fuel-cell, manuf. of B-contg. carbon
 fiber-carbon electrode substrates for fuel
 cells)
- IT Carbon fibers, uses
 (graphite, manuf. of B-contg. graphite fiber-carbon electrode
 substrates for batteries and fuel cells)
- IT 1303-86-2, Boron oxide, uses 10043-35-3, Orthoboric acid,
 uses
 (manuf. of B-contg. carbon fiber-carbon electrode substrates for
 batteries and fuel cells)
- IT 121-43-7, Trimethyl borate
 (manuf. of B-contg. carbon fiber-carbon electrode substrates for
 batteries and fuel cells)
- IT 7782-42-5, Graphite, uses
 (manuf. of B-contg. graphite fiber-carbon electrode substrates
 for batteries and fuel cells)

L94 ANSWER 7 OF 12 HCA COPYRIGHT 2000 ACS

119:226350 Preparation of phosphoramidate analogs of
 5-fluoro-2^o-deoxyuridine. Borch, Richard F.; Fries, Kristin M.
 (University of Rochester, USA). PCT Int. Appl. WO 9306120 A1
 19930401, 47 pp. DESIGNATED STATES: W: CA, JP; RW: AT, BE, CH, DE,
 DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE. (English). CODEN:
 PIXXD2. APPLICATION: WO 1992-US7792 19920915. PRIORITY: US
 1991-763936 19910923.

GI

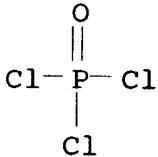


AB Title compds. I [R1 = H, F, C1-4 alkyl; R2 = XCH₂CH₂ wherein X = Br, Cl, I, 4-MeC₆H₄SO₂; R3 = C1-4 alkyl, groups for R2; R2R3N = 5-6-membered heterocyclyl aliph. or aliph. interrupted by a ring O or a 2nd ring N; R4 = H, cation, (4,4,6-trimethyltetrahydro-1,3-oxazin-3-yl)ethyl(Q)] and a salt thereof, useful as neoplasm inhibitors, are prepd. Bu₄N⁺ F⁻ in THF was added at 0.degree. to 3'-O-tert-butyldimethylsilyl-5-fluoro-2'-deoxy-5'-uridyl-2-Q-N-Me,-N-(2-bromoethyl)phosphoramidate (prepn. given) to give I (R1 = F, R2 = BrCH₂CH₂, R3 = Me, R4 = Q) (II). In test against B16 melanoma cells the LC₉₉ of II was 100 .mu.M and IG₅₀ against L210 leukemia cells after 48 h was 2.5 nM.

IT 10025-87-3, **Phosphorus oxychloride**
(reaction of, in prepn. of neoplasm inhibitors)

RN 10025-87-3 HCA

CN Phosphoric trichloride (9CI) (CA INDEX NAME)



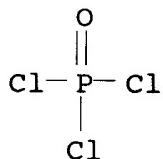
IC ICM C07H019-10
ICS A61K031-70

CC 33-9 (Carbohydrates)

Section cross-reference(s): 1

IT 50-89-5, Thymidine, reactions 50-91-9, 5-Fluoro-2'-deoxyuridine 67-64-1, Acetone, reactions 109-83-1, 2-(Methylamino)ethanol 110-91-8, Morpholine, reactions 951-78-0, 2'-Deoxyuridine 3068-00-6, 1,2,4-Butanetriol 6091-44-7, Piperidine hydrochloride
10025-87-3, Phosphorus oxychloride
 16836-95-6, Silver tosylate 18162-48-6
 (reaction of, in prepn. of neoplasm inhibitors)

- L94 ANSWER 8 OF 12 HCA COPYRIGHT 2000 ACS
 119:4030 Use of haloalkyl derivatives of reporter molecules to analyze metabolic activity in cells. Haugland, Richard P. (Molecular Probes, Inc., USA). PCT Int. Appl. WO 9304192 A1 19930304, 30 pp.
 DESIGNATED STATES: W: CA, JP; RW: AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE. (English). CODEN: PIXXD2.
 APPLICATION: WO 1992-US7068 19920821. PRIORITY: US 1991-749256 19910823.
- AB A method for analyzing enzyme activity in cells comprises use of compd. XR-REPORTER-BLOCK (I; XR=haloalkyl; BLOCK=group removable by enzyme; REPORTER=mol. which has different spectral properties in its blocked and deblocked forms). Cells are contacted with I under conditions leading to its uptake. Within the cell, the enzyme removes BLOCK and makes REPORTER detectable by absorbance or fluorescence, and the haloalkyl moiety reacts with an intracellular thiol to form a thioether conjugate which is retained in the cell for >1 h. The cells are prep'd. for qual. or quant. measurement, and absorbance or fluorescence measurements are made. Various I compds. (e.g., chloromethylfluorescein digalactopyranoside) were prep'd. and tested for cytotoxicity, for uptake and retention by cells, and for suitability for detection of intracellular enzymes (e.g. .beta.-galactosidase, glutathione transferase).
- IT 10025-87-3, Phosphorus oxychloride
 (reaction of, in haloalkyl reporter compd. prepn.)
- RN 10025-87-3 HCA
- CN Phosphoric trichloride (9CI) (CA INDEX NAME)



- IC ICM C12Q001-00
 ICS C12Q001-02; C12Q001-34; C12Q001-37; C12Q001-40; C12Q001-42;
 C12Q001-44; C12Q001-46; C12Q001-54
- CC 7-3 (Enzymes)
 Section cross-reference(s): 9
- IT 108-46-3, Resorcinol, reactions 111-64-8, Octanoyl chloride
 150-19-6, 3-Methoxyphenol 541-41-3, Ethyl chloroformate 591-27-5
 638-07-3, Ethyl-4-chloroacetoacetate 3068-32-4 10025-87-3
 , Phosphorus oxychloride 16060-65-4
 21085-72-3 79955-27-4 147963-31-3
 (reaction of, in haloalkyl reporter compd. prepn.)

- L94 ANSWER 9 OF 12 HCA COPYRIGHT 2000 ACS
 116:135528 Performance-oriented packaging standards; changes to classification, hazard communication, packaging and handling requirements based on UN standards and agency initiative. (United

States Dept. of Transportation, Washington, DC, 20590-0001, USA). Fed. Regist., 55(246), 52402-729 (English) 21 Dec 1990. CODEN: FEREAC. ISSN: 0097-6326.

- AB The hazardous materials regulations under the Federal Hazardous Materials Transportation Act are revised based on the United Nations recommendations on the transport of dangerous goods. The regulations cover the classification of materials, packaging requirements, and package marking, labeling, and shipping documentation, as well as transportation modes and handling, and incident reporting. Performance-oriented stds. are adopted for packaging for bulk and nonbulk transportation, and SI units of measurement generally replace US customary units. Hazardous material descriptions and proper shipping names are tabulated together with hazard class, identification nos., packing group, label required, special provisions, packaging authorizations, quantity limitations, and vessel stowage requirements.
- IT **10025-87-3, Phosphorus oxychloride**
(packaging and transport of, stds. for)

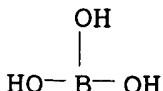
L94 ANSWER 10 OF 12 HCA COPYRIGHT 2000 ACS
109:76600 Sintering aid for lanthanum chromite refractories used as electronically conductive interconnect layer in fuel cell or other electronic device. Flandermeier, Brian K.; Poeppel, Roger B.; Dusek, Joseph T.; Anderson, Harlan U. (United States Dept. of Energy, USA). U. S. Pat. Appl. US 922429 A0 19880315, 20 pp. Avail. NTIS Order No. PAT-APPL-6-922 429. (English). CODEN: XAXXAV. APPLICATION: US 1986-922429 19861023.

AB Addns. including a B oxide and a eutectic-forming compn. of Group 2A metal fluorides with Group 3B metal fluorides and Group 2A metal oxides with Group 6B metal oxides lower the required firing temp. of LaCrO₃ in a monolithic structure with electrode materials to permit densification to >94% theor. without degrdn. of electrode material lamina. The monolithic structure is formed by tape casting thin layers of electrode, interconnect, and electrolyte materials and sintering the green lamina together under common densification conditions. Thus, a mixed oxide powder of stoichiometric proportions LaCr0.9Mg0.1O₃ and 10% H₃BO₃ were slurried with Cerbind (CH₂Cl₂, MeCOEt) to form a slip for tape casting. The tape was cast on a substrate and fired at 1600 K to form an integral, elec. conductive layer of >94% theor d.

IT **10043-35-3, Boric acid (H₃BO₃), uses and miscellaneous (sintering aids, for lanthanum chromite for fuel cells and electronic devices)**

RN 10043-35-3 HCA

CN Boric acid (H₃BO₃) (6CI, 8CI, 9CI) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 57, 76

IT Fuel cells
 (interconnects, lanthanum chromite, sintering aids for)

IT 1303-86-2, Boron oxide, uses and miscellaneous 1305-78-8, Calcium oxide, uses and miscellaneous 1308-38-9, Chromium oxide, uses and miscellaneous 1309-48-4, Magnesium oxide, uses and miscellaneous 1312-81-8, Lanthanum oxide 10043-35-3, Boric acid (H₃BO₃), uses and miscellaneous 14060-30-1, Yttrium borate 57456-12-9, Lanthanum borate
 (sintering aids, for lanthanum chromite for fuel cells and electronic devices)

IT 115927-76-9, Chromium lanthanum magnesium oxide (Cr_{0.9}LaMg_{0.1}O₃)
 (sintering of electronically conductive, for fuel cells and electronic devices, aids for)

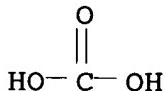
L94 ANSWER 11 OF 12 HCA COPYRIGHT 2000 ACS
 104:189698 Performance of molten carbonate fuel cells
 with low pressure electrolyte (I). Sounai, Atsuo; Murata, Kenji;
 Shirogami, Tamotsu (Toshiba Res. Dev. Cent., Kawasaki, 210, Japan).
 Denki Kagaku oyobi Kogyo Butsuri Kagaku, 54(2), 143-8 (Japanese)
 1986. CODEN: DKOKAZ. ISSN: 0366-9297.

AB A new type of molten carbonate fuel cell composed of the low pressure molded electrolyte layer and the dual porosity electrodes was developed. The electrolyte plate was formed of the mixt. of the alk. carbonate, LiAlO₂ powder, Al₂O₃ fibers, and org. binder under a pressure of .apprx.100 kg/cm² and a temp. of .apprx.160.degree.. The electrolyte plate became porous after removal of the binder, but mutual cross-leakage of the reaction gases through the cell was prevented by using dual porosity electrodes that allow for penetration of the electrolyte into the fine pores of the electrodes during cell operation.

IT 463-79-6DP, compds.
 (alk. metal salts, fuel cell electrolytes
 contg. molten, manuf. and performance of)

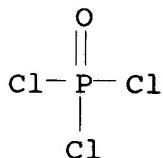
RN 463-79-6 HCA

CN Carbonic acid (7CI, 8CI, 9CI) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST fuel cell molten carbonate; electrode porous
 fuel cell; electrolyte molded
 fu l cell
 IT Fu l c lls
 (molten-carbonate, with low-pressure electrolytes, manuf. and performance of)

- IT 463-79-6DP, compds.
(alk. metal salts, fuel c 11 electrolytes
contg. molten, manuf. and performance of)
- IT 12003-67-7
(electrolyte contg., molten carbonate fuel cell
, manuf. and performance of)
- IT 1344-28-1P, uses and miscellaneous
(fibers, electrolyte contg., molten carbonate fuel
cell, manuf. and performance of)
- L94 ANSWER 12 OF 12 HCA COPYRIGHT 2000 ACS
90:194551 Discharge reaction mechanisms in lithium/thionyl chloride
cells. Schlaikjer, Carl R.; Goebel, Franz; Marincic, Nikola (Power
Sources Cent., GTE Lab., Inc., Waltham, Mass., USA). J.
Electrochem. Soc., 126(4), 513-22 (English) 1979. CODEN: JESOAN.
ISSN: 0013-4651.
- AB The processes taking place during the discharge of Li/SOCl₂/C cells
were studied. Test vehicles included wound D, bobbin configuration
2D cells, and 200 A-h prismatic cells. Dried
cathodes taken from 2D cells, discharged at 150 mA were analyzed
quant. for Li-S oxyacid salts. Little or no such salt was found for
cells discharged at ambient temp. Measurements of the open-circuit
voltage of this system as a function of temp. showed essentially
linear dependence with pos. slope between +72.degree. and
-20.degree., but the voltage fell more steeply as the temp.
approached -60.degree.. Appearance of a nonvolatile reducing
species occurred in the cathodes of cells discharged at -20.degree.,
which were not present in cathodes from cells discharged at higher
temp. Controlled potential electrolysis of supporting electrolytes
contg. limited amts. of SOCl₂ were carried out between 0 and
25.degree.. The 2000 A-h cells were used to
measure dissolved SO₂ and SO₂ escaping at atm. pressure and ambient
temp. from anode-limited and cathode-limited cells. The amt. of SO₂
produced was found to be only a fraction of that predicted by the
reaction, 4Li + 2SOCl₂.fwdarw. S + SO₂ + 4LiCl, until near the end
of discharge. The total amt. of SO₂ produced by the end of
discharge was not more than predicted by this reaction. Vented,
anode-limited cells did not release SO₂ while cathode-limited cells
did. Temp. cycling of electrolyte taken from cells immediately
after discharge was carried out in a sealed vessel. Pressure
hysteresis occurred, which could not be duplicated with simulated
used electrolyte made with S, SO₂, SOCl₂, LiAlCl₄, and cathode
material. At -20.degree. and below, other discharge reaction
mechanisms are discussed.
- IT 10025-87-3
(thionyl chloride electrochem. redn. on carbon in)
- RN 10025-87-3 HCA
- CN Phosphoric trichloride (9CI) (CA INDEX NAME)



CC 72-2 (Electrochemistry)
 IT 10025-87-3
 (thionyl chloride electrochem. redn. on carbon in)

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L92 ANSWER 1 OF 17 HCA COPYRIGHT 2000 ACS
 133:107320 Novel proton exchange membrane thin-film
 fuel cell for microscale energy conversion.
 Morse, Jeffrey D.; Jankowski, Alan F.; Graff, Robert T.; Hayes,
 Jeffrey P. (Lawrence Livermore National Laboratory, Livermore, CA,
 94550, USA). J. Vac. Sci. Technol., A, 18(4, Pt. 2), 2003-2005
 (English) 2000. CODEN: JVTAD6. ISSN: 0734-2101. Publisher:
 American Institute of Physics.

AB Thin-film, proton exchange membrane fuel
 cells are developed using photolithog. patterning, phys.
 vapor deposition, and spin-cast deposition techniques. In
 this study, micrometer-thick layers of nickel and platinum
 electrodes, as well as the proton conducting
 electrolyte layer of perfluorinated sulfonic acid, are synthesized.
 The anode layer is conductive to pass the elec. current and provides
 mech. support to the electrolyte and cathode layer that enables
 combination of the reactive gases. The morphol. desired for both
 the anode and cathode layers facilitates generation of max. c.d.
 from the fuel cell. For these purposes, the
 parameters of the deposition process and post-deposition patterning
 are optimized for continuous porosity across both electrode layers.
 The power output detd. from current-voltage measurements is
 characterized at various temps. in the range of 60-90.degree. using
 dil. (4%) hydrogen fuel.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST proton exchange membrane fuel cell
 microscale energy conversion

IT Sulfonic acids, uses
 (perfluoro, proton conducting electrolyte;
 development of proton exchange membrane thin-film
 fuel cells with)

IT Fuel cells
 (proton exchange membrane; development of proton
 exchange membrane thin-film fuel
 cells for microscale energy conversion)

IT Perfluoro compounds
 (sulfonic acids, proton conducting

- electrolyte; development of proton exchange m mbrane
thin-film fu l c lls with)
- IT 7440-02-0, Nickel, uses 7440-06-4, Platinum, uses
(electrode; development of proton exchange membrane
thin-film fuel cells with)
- L92 ANSWER 2 OF 17 HCA COPYRIGHT 2000 ACS
133:91702 Reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions. Ziaka, Zoe D.; Vasileiadis, Savvas (USA). U.S. US 6090312 A 20000718, 13 pp. (English). CODEN: USXXAM. APPLICATION: US 1996-595040 19960131.
- AB New process designs are presented for reforming reactions of steam with hydrocarbons (such as methane, natural gas, light hydrocarbon feedstocks with one to four carbon atoms in each mol.), also for the water gas shift reaction that is of steam with carbon monoxide; also for carbon dioxide reforming of hydrocarbons (such as methane, acidic natural gas, coal gas, landfill gas, light hydrocarbon feedstocks with one to four carbon atoms in each mol.), and the combined reaction of steam carbon dioxide with same hydrocarbons. The processes employ org. polymer, org. polymer-inorg. support, and inorg. membrane permeators for species sepn., with the permeators placed after the reactors where the above named reactions take place. The membranes in permeators sep. selectively the H₂ and CO₂ species exiting from the reactors from the non-permeated reactants and products. The reject streams coming out of permeators can be recycled into the inlet of the first reactors; these reject streams can be also fed to consecutively placed steam reforming and water gas shift reactors for further conversion to H₂ and CO₂ products. The sepd. H₂ and CO₂ in membrane permeate and from the secondary reactions of permeator reject streams, can be used for direct methanol synthesis, feed to molten carbonate fuel cells, and other chem. syntheses; after the removal of CO₂ from the mixt., pure hydrogen can be recovered and used in chem. syntheses and as fuel in fuel cells and power generation cycles.
- IC ICM C07C001-02
NCL 252373000
CC 51-4 (Fossil Fuels, Derivatives, and Related Products)
Section cross-reference(s): 52
ST membrane process hydrocarbon reforming; water gas shift reactor membrane
IT Polyamides, uses
(derivs; reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)
IT Vinyl compounds, uses
(halo, polymers; reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)
IT Waste gases
(landfill; reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)
IT Coal gas
Flue gases

Membran s, nonbiological

Petroleum reforming

Steam reforming

(reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)

IT Polyamides, uses

Polybenzimidazoles

Polycarbonates, uses

Polyimides, uses

Polyphosphazenes

Polysiloxanes, uses

Polysulfones, uses

(reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)

IT Natural gas, reactions

(reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)

IT 64-19-7D, Acetic acid, derivs, polymers 1314-23-4, Zirconia, uses 1344-28-1, Alumina, uses 7631-86-9, Silica, uses 9003-53-6 13463-67-7, Titania, uses 25038-54-4D, Polycaprolactam, derivs 25722-33-2D, Parylene, derivs

(reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)

IT 64-17-5, Ethanol, reactions 67-56-1, Methanol, reactions

74-82-8, Methane, reactions 74-84-0, Ethane, reactions 74-98-6, Propane, reactions 75-28-5, Iso-butane 106-97-8, Butane, reactions

(reactor-membrane permeator process for hydrocarbon reforming and water gas-shift reactions)

L92 ANSWER 3 OF 17 HCA COPYRIGHT 2000 ACS

132:266091 Ionomeric membranes based on partially sulfonated

poly(styrene): synthesis, proton conduction and

methanol permeation. Carretta, N.; Tricoli, V.; Picchioni, F.

(Dipartimento di Ingegneria Chimica, Chimica Industriale e Scienza dei Materiali, University of Pisa, Pisa, 56126, Italy). J. Membr. Sci., 166(2), 189-197 (English) 2000. CODEN: JMESDO. ISSN: 0376-7388. Publisher: Elsevier Science B.V..

AB Homogeneously sulfonated polystyrene (SPS) was prep'd. with various concns. of sulfonic acid groups. Membranes cast from these materials were investigated in relation to proton cond. and methanol permeability at 20-60.degree.C. It was found that both these properties increase as the polymer is increasingly sulfonated, with abrupt jumps occurring at a concn. of sulfonic acid groups of about 15 mol%. The most extensively sulfonated membrane exhibited cond. equal to that of Nafion. As a consequence, this membrane material is potentially an appealing alternative to the very expensive Nafion, for a no. of electrochem. applications. For the mbrane with the highest degree of sulfonation we measured a methanol permeability about 70% smaller than for Nafion. This characteristic is esp. desirable in applications related to the direct methanol

CC **fu l cell.**
 CC 38-3 (Plastics Fabrication and Uses)
 ST Section cross-reference(s): 37, 52, 72
 ST sulfonated polystyrene ionomer membrane
 IT Sulfonation
 (effect on proton conduction and methanol
 permeation of sulfonated polystyrene ionomer membranes)
 IT Membranes, nonbiological
 IT Permeation
 (prepn., proton conduction and methanol
 permeation of sulfonated polystyrene ionomer membranes)
 IT Fuel cell separators
 (prepn., proton conduction and methanol
 permeation of sulfonated polystyrene ionomer membranes
 for)
 IT Ionic conductivity
 (proton; prepn., proton conduction
 and methanol permeation of sulfonated polystyrene ionomer
 membranes)
 IT Ionomers
 (sulfo-contg., membranes; prepn., proton
 conduction and methanol permeation of)
 IT 9003-53-6DP, Polystyrene, sulfonated
 (ionomer membranes; prepn., proton
 conduction and methanol permeation of)
 IT 67-56-1, Methanol, properties
 (prepn., proton conduction and methanol
 permeation of sulfonated polystyrene ionomer membranes)

L92 ANSWER 4 OF 17 HCA COPYRIGHT 2000 ACS

131:145263 Crosslinked sulfonated polymers and method for preparing same. Michot, Christophe; Armand, Michel (Hydro-Quebec, Can.). PCT Int. Appl. WO 9938897 A1 19990805, 43 pp. DESIGNATED STATES: W: CA, JP, US; RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (French). CODEN: PIXXD2. APPLICATION: WO 1999-CA78 19990129. PRIORITY: CA 1998-2228467 19980130; CA 1998-2236197 19980428.

AB The invention concerns crosslinked sulfonated polymers, optionally perfluorinated, having ionic charges on the sulfo groups and the method for prep. them. When they are molded in the form of membranes, said polymers are useful in fuel cells and electrochem. cells, in a chlorine-sodium electrolysis process, as separator in en electrochem. prepn. of org. and inorg. compds., as separator between an aq. phase and an org. phase, or as catalyst for Diels-Alder addns., Friedel-Craft reactions, aldol condensations, cationic polymn., esterification, and acetal formation. Thus, fluorinating a Nafion 117 membrane in the Li salt form by Me₂NSF₂ in THF, reacting the resulting m mbrane having SO₂F groups 3 h in diglyme under reflux with hexamethyldisilazane Li salt, rinsing with THF, aging the film 48 h in THF contg. Li trimethylsilanoate, rinsing the film with water and EtOH, and exchanging the metal ions for protons by

several immersions in 2 M HNO₃ gave a membran with 32% of the sulfonyl groups in the form of sulfonimide and 78% in the form of sulfonate.

- IC ICM C08F008-44
 ICS C08G081-00; C08G085-00; C08J005-22
 CC 37-6 (Plastics Manufacture and Processing)
 Section cross-reference(s): 24, 35, 67, 72
 ST ion group contg crosslinked sulfonated polymer membrane manuf; lithium methyldisilazane crosslinker sulfonated polymer membrane
 IT Fuel cells
 (polymers having ionic charges on sulfo crosslinking groups for fuel cells)
 IT Membranes, nonbiological
 (polymers having ionic charges on sulfo crosslinking groups for membranes)
 IT 10028-15-6P, Ozone, preparation
 (polymers having ionic charges on sulfo crosslinking groups membranes for prodn. of ozone)

L92 ANSWER 5 OF 17 HCA COPYRIGHT 2000 ACS

- 130:40853 Low-cost membranes for PEM fuel cells. Yen, Shiao-Ping "Elizabeth"; Kindler, Andrew; Yavrouian, Andre (Jet Propulsion Laboratory, Pasadena, CA, 91109-8099, USA). Proc. Power Sources Conf., 38th, 469-472 (English) 1998. CODEN: PPOCFD. Publisher: National Technical Information Service.
- AB Arom. semicryst. polymers such as poly p-Ph ether-ether ketone (PEEK) and poly-p-Ph ether sulfone (PES) were used as starting materials to produce proton conducting ionomers. These are sulfonated poly p-Ph ether-ether ketone (H-SPEEK) and sulfonated poly-p-Ph ether sulfone (H-SPES), resp. After numerous expts. with these 2 polymers it was detd. that mixt. of HSPES and PES or mixts. of different equiv. wts. of HSPES could be cast into useful, robust membranes. The newly prep'd. proton conducting membranes were incorporated into membrane electrode assemblies (MEA) and tested as working MeOH fuel cells. The best HSPES MEA delivered 387 mV at 300 mA/cm², at 91.degree. and 20 psig air using 1M MeOH.
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
- ST fuel cell membrane sulfonated polymer
- IT Fuel cells
 (MeOH; low cost membranes for PEM fuel cells)
- IT Electric conductivity
 Fuel cell electrolytes
 (low cost m mbranes for PEM fu l cells)
- IT Polyketones
 Polysulfones, uses

(polyether-, arom., sulfonated; low cost membranes for PEM fuel cells)

IT Polyethers, uses
(polyketone-, arom., sulfonated; low cost membranes for PEM fuel cells)

IT Polyethers, uses
(polysulfone-, arom., sulfonated; low cost membranes for PEM fuel cells)

IT Ionomers
(proton conducting; low cost membranes for PEM fuel cells)

IT 25667-42-9 31694-16-3D, Peek, sulfonated
(low cost membranes for PEM fuel cells)

IT 67-56-1, Methanol, uses
(low cost membranes for PEM fuel cells)

L92 ANSWER 6 OF 17 HCA COPYRIGHT 2000 ACS
129:276845 Study of blend membranes consisting of nafion.RTM.
and vinylidene fluoride-hexafluoropropylene copolymer. Lin,
Jung-Chou; Ouyang, Meng; Fenton, James M.; Kunz, H. Russell;
Koberstein, Jeffrey T.; Cutlip, Michael B. (Department of Chemical
Engineering, University of Connecticut, Storrs, CT, 06269, USA). J.
Appl. Polym. Sci., 70(1), 121-127 (English) 1998. CODEN: JAPNAB.
ISSN: 0021-8995. Publisher: John Wiley & Sons, Inc..
AB An attempt to modify membranes for direct methanol
fuel cells by blending Nafion with a vinylidene
fluoride-hexafluoropropylene copolymer (VDF-HFP copolymer) from
their solns. is reported. The purpose of this work was to reduce
the methanol transport while still retaining the essential
proton cond. in a water-contg. environment. The
apparent cond., methanol barrier property, and equil. contact angle
as a function of the membrane compns. are discussed. The
blend membranes were also investigated using X-ray
diffraction (XRD) and differential scanning calorimetry (DSC).
Compared with the pure Nafion membrane, the Nafion/VDF-HFP
copolymer blend membrane with 62.5 vol % of the VDF-HFP
copolymer shows a decrease in the apparent cond. by about 2 orders
of magnitude, and the methanol barrier properties increase
substantially when only 25 vol % of the VDF-HFP-copolymer is
incorporated. The equil. contact angles of water drops on the
Nafion/VDF-HFP copolymer blend membranes as a function of
the VDF-HFP copolymer content are rather similar to the plot of the
advancing angle vs. the percentage of the lower-surface-energy
phase. X-ray diffraction studies indicate that these two polymers
crystallize sep. when blended and cast from their solns.,
and the crystn. behavior is equiv. to that of the unblended state.
DSC reveals that when the VDF-HFP copolymer is mixed with Nafion in
their soln. forms, an interdiffusion or other interaction takes
place at the interfaces between their noncryst. regions.

CC 37-5 (Plastics Manufacture and Processing)

ST Section cross-reference(s): 38
 perfluorosulfonate ionomer blend fluoropolymer membrane;
 Nafion vinylidene fluoride hexafluoropropylene copolymer blend

IT Ionomers
 (fluoropolymers; study of blend membranes consisting of nafion.RTM. and vinylidene fluoride-hexafluoropropylene copolymer)

IT Fluoropolymers, properties
 (ionomers; study of blend membranes consisting of nafion.RTM. and vinylidene fluoride-hexafluoropropylene copolymer)

IT Contact angle
 Crystallinity
 Diffusion
 Electric conductivity
 (study of blend membranes consisting of nafion.RTM. and vinylidene fluoride-hexafluoropropylene copolymer)

IT Fluoropolymers, properties
 Polymer blends
 (study of blend membranes consisting of nafion.RTM. and vinylidene fluoride-hexafluoropropylene copolymer)

IT 9011-17-0, Vinylidene fluoride-hexafluoropropylene copolymer
 (study of blend membranes consisting of nafion.RTM. and vinylidene fluoride-hexafluoropropylene copolymer)

IT 67-56-1, Methanol, processes
 (study of blend membranes consisting of nafion.RTM. and vinylidene fluoride-hexafluoropropylene copolymer)

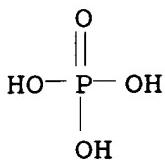
L92 ANSWER 7 OF 17 HCA COPYRIGHT 2000 ACS

127:334146 Proton-conducting polymer electrolytes
 prepared by direct acid casting. Savinell, Robert F.;
 Litt, Morton H. (Case Western Reserve University, USA). PCT Int.
 Appl. WO 9737396 A1 19971009, 22 pp. DESIGNATED STATES: W: AL, AU,
 BA, BB, BG, BR, CA, CN, CU, CZ, EE, GE, HU, IL, IS, JP, KP, KR, LC,
 LK, LR, LT, LV, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, TR, TT,
 UA, UZ, VN, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ,
 CF, CG, CH, CI, CM, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC,
 ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2.
 APPLICATION: WO 1997-US5432 19970401. PRIORITY: US 1996-627769
 19960401.

AB Solid polymer electrolyte membranes are obtained by prep. a soln. of the polymer dissolved in an acid solvent contg. a doping acid, casting the soln. to produce a membrane, and drying the cast membrane. A solid polymer electrolyte membrane exhibiting enhanced cond. in MeOH/air fuel cell is prep'd. by casting the polymer from a soln. of HO₂CCF₃/H₃PO₄ contg. .gt;req.300 mol% polymer.

IT 7664-38-2, Phosphoric acid, uses
 (proton-conducting polymer electrolytes
 prep'd. by direct casting from soln. of trifluoroacetic acid and)

RN 7664-38-2 HCA
 CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



- IC ICM H01M008-02
 ICS H01M008-10
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 38
 ST acid casting proton conducting polymer
 electrolyte; trifluoroacetic acid conducting polymer electrolyte
 casting; phosphoric acid conducting polymer electrolyte
 casting; methanol air fuel cell polymer
 electrolyte
 IT Electric conductivity
 (of polybenzimidazole electrolytes prep'd. by direct acid
 casting)
 IT Fuel cell electrolytes
 (proton-conducting polymer electrolytes
 prep'd. by direct acid casting)
 IT Polybenzimidazoles
 (proton-conducting polymer electrolytes
 prep'd. by direct casting from trifluoroacetic
 acid/phosphoric acid soln.)
 IT 76-05-1, Trifluoroacetic acid, uses
 (proton-conducting polymer electrolytes
 prep'd. by direct casting from soln. of phosphoric acid
 and)
 IT 376-73-8, Hexafluoroglutaric acid 2892-51-5, Squaric acid
 (proton-conducting polymer electrolytes
 prep'd. by direct casting from soln. of phosphoric acid
 and trifluoroacetic acid and)
 IT 7664-38-2, Phosphoric acid, uses
 (proton-conducting polymer electrolytes
 prep'd. by direct casting from soln. of trifluoroacetic
 acid and)

- L92 ANSWER 8 OF 17 HCA COPYRIGHT 2000 ACS
 127:102306 Ceramic membranes - potential uses for solid state
 protonic conductors. Zhu, Bin; Rundgren, Kent;
 Mellander, Bengt-Erik (Department of Materials Science, Angstroem
 Laboratory, Box 534, S-751 21, Uppsala, Swed.). Solid State Ionics,
 97(1-4), 385-391 (English) 1997. CODEN: SSIOD3. ISSN: 0167-2738.
 Publisher: Elsevier.
 AB Using different wet-ceramic processes and ceramic m mbran
 technol. various thin or thick ceramic m mbran materials

were prep'd. The thin film ceramic membranes, prep'd. using the gel-soln. process, have different material characteristics compared with the bulk materials, for example, higher ionic cond. in the film plane than in the perpendicular direction. A very sensitive humidity dependence of the cond. has been obsd. in the thin film ceramic membranes. Therefore, these membrane materials have a potential use for constructing new types of proton conducting electrolyte fuel cells and hydrogen or humidity sensors.

CC 76-2 (Electric Phenomena)
 Section cross-reference(s): 57
 ST ceramic membrane proton conductor
 IT Ionic conductors
 Sol-gel processing
 Tape casting
 (ceramic membranes, potential uses for solid state protonic conductors)
 IT Ceramic membranes
 (for solid state protonic conductors)
 IT 1344-28-1, Alumina, properties 7631-86-9, Silica, properties 10377-48-7, Lithium sulfate
 (ceramic membranes, potential uses for solid state protonic conductors)

L92 ANSWER 9 OF 17 HCA COPYRIGHT 2000 ACS
 123:261674 New hydrocarbon proton exchange membranes based on sulfonated styrene-ethylene/butylene-styrene triblock copolymers. Wnedk, Gary E.; Rider, Jeffrey N.; Serpico, Joseph M.; Einset, Alison G.; Ehrenberg, Scott G.; Raboin, Louis A. (Dep. Chem. Cent. Polymer Synthesis, Rensselaer Polytechnic Inst., Troy, NY, 12180-3590, USA). Proc. - Electrochem. Soc., 95-23(Proton Conducting Membrane Fuel Cells I), 247-51 (English) 1995. CODEN: PESODO. ISSN: 0161-6374.

AB Com. available styrene-ethylene/butylene-styrene triblock polymer (Kraton G1650) was partially sulfonated using a SO₃/triethyl phosphate reagent in a dichloroethane/cyclohexane mixed solvent. Films of the product were cast from lower alcs. to give elastic materials with different degrees of sulfonation (ca. 30-60%) as detd. by titrn. TEM suggests that the cast films possess cylindrical sulfonated polystyrene domains. The films swell in water, with the extent of swelling being dependent on the sulfonation level. Ionic conductivities as high as 8.5 .times. 10⁻² S/cm are obtained when fully hydrated, and compare favorably to those exhibited by hydrated, sulfonated fluoropolymers such as Nafion.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 39
 ST sulfonated triblock copolymer proton exchange mbrane;
 fuel cell proton exchange membrane
 copolymer; styrene ethylene butylene triblock copolymer mbrane; Kraton G1650 sulfonated proton exchange

- membran
IT Electric conductivity and conduction
Fuel-cell electrolytes
(new hydrocarbon proton exchange membranes
based on styrene-ethylene/butylene-styrene triblock copolymers)
- IT Rubber, butadiene-styrene, preparation
(hydrogenated, block, reaction products, partially sulfonated;
new hydrocarbon proton exchange membranes based on)
- IT 106107-54-4P
(rubber, hydrogenated, block, reaction products, partially
sulfonated; new hydrocarbon proton exchange membranes
based on)
- L92 ANSWER 10 OF 17 HCA COPYRIGHT 2000 ACS
122:218566 High performance polymer electrolyte fuel
cells. Okuyama, Kazuo; Suzuki, Yoshio (Asahi Chemical Ind,
Japan). Jpn. Kokai Tokkyo Koho JP 06295729 A2 19941021 Heisei, 8
pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1994-13550
19940207. PRIORITY: JP 1993-21297 19930209.
- AB The fuel cells have ion exchanger electrolyte
membranes in contact with gas diffusion electrodes having a
molded catalyst layer, which contains a catalyst laden
conductive material 0.400-0.995, a hydrophobic agent 0-0.55, and a
proton conductive material 0.005-0.080 wt. parts.
- IC ICM H01M004-86
ICS H01M004-88; H01M008-02; H01M008-10
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST polymer electrolyte fuel cell electrode;
fuel cell electrode catalyst layer; proton
conductor fuel cell electrode
- IT Carbon black, uses
(electrode catalyst layers contg. proton
conductive materials for high performance polymer
electrolyte fuel cells)
- IT Sulfonic acids, uses
(alkane, perfluorinated, Aciplex; electrode catalyst layers
contg. proton conductive materials for high
performance polymer electrolyte fuel cells)
- IT Polyoxyalkylenes, uses
(fluorine- and sulfo-contg., ionomers, electrode catalyst layers
contg. proton conductive materials for high
performance polymer electrolyte fuel cells)
- IT Electrodes
(fuel-cell, electrode catalyst layers contg.
proton conductive materials for high
performance polymer electrolyte fuel cells)
- IT Fluoropolymers
(polyoxyalkylene-, sulfo-contg., ionomers, electrode catalyst
layers contg. proton conductive materials for
high performance polymer electrolyte fuel cells
)
- IT Ionomers

(polyoxyalkylenes, fluorine- and sulfo-contg., electrode catalyst layers contg. proton conductiv materials for high performance polymer electrolyte fuel cells
)

IT 7440-06-4, Platinum, uses
(electrode catalyst layers contg. proton conductive materials for high performance polymer electrolyte fuel cells)

L92 ANSWER 11 OF 17 HCA COPYRIGHT 2000 ACS
121:234664 Electrode membranes containing polymeric ion exchange materials for fuel cells. Ledjeff, Konstantin; Nolte, Roland; Bauer, Michael; Mahlendorf, Falko; Peinecke, Volker (Fraunhofer-Gesellschaft Zur Foerderung der Forschung e.V., Germany). Ger. DE 4241150 C1 19940601, 16 pp. (German). CODEN: GWXXAW. APPLICATION: DE 1992-4241150 19921207.

AB The electrode membranes comprise a polymeric ion exchange material contacted with electrodes on both sides, where the polymeric material is formed from, e.g., substituted polydienes, polyalkenes, polyphenyleneoxides, polyphenylenesulfides, polyesters, polycarbonates, polyurethanes.

IC ICM H01M004-94

ICS C25B011-20; B01J047-12; C25B013-08; C25B009-00

ICA C08J005-22

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell electrode membrane composite

IT Group VIII elements

Phosphazene polymers

Polyamides, uses

Polybenzimidazoles

Polybenzoxazoles

Polycarbonates, uses

Polyesters, uses

Polyoxyphenylenes

Polysulfones, uses

Polythiophenylenes

Polyureas

Siloxanes and Silicones, uses

Urethane polymers, uses

(electrode membranes contg. polymeric ion exchange materials for fuel cells)

IT Membranes

(fuel-cell electrode, composite; electrode membranes contg. polymeric ion exchange materials for fuel cells)

IT Polymers, uses

(polydithiazoles; electrode membranes contg. polymeric ion exchange materials for fuel cells)

IT Electrodes

(fuel-cell, membranes, composite; electrode membranes contg. polymeric ion exchange materials for fuel cells)

- IT Polymers, uses
 (polybenzothiazoles, electrode membranes contg.
 polymeric ion exchange materials for fuel cells
)
- IT Polyketones
 Polysulfones, uses
 (polyether-, electrode membranes contg. polymeric ion
 exchange materials for fuel cells)
- IT Polyethers, uses
 (polyketone-, electrode membranes contg. polymeric ion
 exchange materials for fuel cells)
- IT Alkadienes
 Alkenes, uses
 (polymers, electrode membranes contg. polymeric ion
 exchange materials for fuel cells)
- IT Polyquinoxalines
 (polyphenylquinoxalines, electrode membranes contg.
 polymeric ion exchange materials for fuel cells
)
- IT Polymers, uses
 (polysulfonates, electrode membranes contg. polymeric
 ion exchange materials for fuel cells)
- IT Polyethers, uses
 (polysulfone-, electrode membranes contg. polymeric ion
 exchange materials for fuel cells)
- IT 78-67-1, Azobis(isobutyronitrile) 10195-67-2, 4,4'-
 Oxybis(benzenesulfonylsemicarbazide)
 (solvent; electrode membranes contg. polymeric ion
 exchange materials for fuel cells)

L92 ANSWER 12 OF 17 HCA COPYRIGHT 2000 ACS
 70:88643 Plating permselective membrane. Bartrum, Basil E.
 (Dow Chemical Co.). Brit. GB 1143883 19690226, 9 pp. (English).
 CODEN: BRXXAA. APPLICATION: GB 19670623.

AB An electroconductive coating layer is deposited on a surface of a
 permselective membrane by contact of a metallic compd.
 with a reducing agent in contact with the surface to be coated. The
 metallic component and the reducing agent are brought into contact
 with opposite surfaces of the membrane. The coated
 membranes are useful in the manuf. of fuel
 cells in which elec. current is generated by the energy
 given off by a controlled chem. reaction. Thus, hollow, permeable
 polyethylene fiber (outside diam. 190 .mu., inside diam. 120 .mu.)
 produced by melt spinning was chlorosulfonated with 10% ClSO₃H, the
 fiber hydrolyzed, washed with H₂O, and cast into a bundle
 by sealing its ends by using an epoxy resin compn. contg. the
 diglycidyl ether of bisphenol 14.7, N-(soya alkyl)-1,3-
 propylenediamine 6.8, and di-methylaminopropylamine 1.1 parts. On
 the outside of the fibers was placed a soln. consisting of 3.5 parts
 AgNO₃ in 3.0 parts H₂O with enough NH₄OH to dissolve the ppt.
 initially formed. Through the interior of the fibers was passed a
 continuous stream of a soln. prep'd. by addn. of 0.166 part Rochelle

salt (K Na tartrate) to a boiling soln. of 0.2 part AgNO₃ in 100 parts H₂O, boiling 5 min., and filtration of the soln. The plating operation was continued 1 hr. to give the inside of the fibers a good adherent coating of Ag. Other reducing agents used were PhNNH₂, Na hypophosphite, Na₂S₂O₄, NH₂NH₂.H₂SO₄, or H₂NNH₂.H₂O. Other metallic salts used were NiSO₄, copper oxide, H₂PtCl₆.6H₂O, and HAuCl₄.

- IC C23C
 CC 37 (Plastics Fabrication and Uses)
 ST metalplating permselective membranes; permselective membranes metalplating; fuel cell membranes; chlorosulfonated polyethylene fibers plating; polyethylene chlorosulfonated fibers plating; silver plating polyethylene membranes; nickel plating polyethylene membranes; copper plating polyethylene membranes; gold plating polyethylene membranes
 IT Resins, epoxy, uses and miscellaneous
 (cation-exchanging membranes from sulfonated ethylene polymer fibers and, metal plating on)
 IT Membranes
 (cation-exchanging, plating on, with metals)
 IT Fiber, synthetic
 (ethylene polymers, sulfonated, cation-exchanging membranes from, metal plating on)
 IT Fuel cells
 (membranes for, metal plating on)
 IT Cation exchangers, uses and miscellaneous
 (membranes, metal plating on)
 IT Coating materials
 (metals, on cation-exchanging membranes)
 IT 7440-22-4, uses and miscellaneous
 (coatings of, on cation-exchanging membranes)
 IT 9002-88-4, uses and miscellaneous
 (sulfonated, fibers, cation-exchanging membranes from, metal plating on)
- L92 ANSWER 13 OF 17 HCA COPYRIGHT 2000 ACS
 70:5042 Porous, extensively fibrillated poly(tetrafluoroethylene). Landi, Henry P. (American Cyanamid Co.). U.S. US 3407249 19681022, 5 pp. (English). CODEN: USXXAM. APPLICATION: US 19650629 19660228.
- AB Poly(tetrafluoroethylene) (I) aq. dispersions are hot milled with 40-98% poly(Me methacrylate) (II) at 170-200.degree. and compression molded into sheets that are then solvent extd. to remove II and leave wettable, unsintered, porous, and completely fibrillated I films useful as electrolyte matrixes in fuel cells. For example, a 4:1 blend (based on solids) of II and an aq. dispersion contg. 59-61 wt. % I and 5.5-6.5 wt. % polyethylene glycol octylphenol ether (wetting agent) was milled on preheated rolls at 70-5.degree.. I particles formed interwoven fibers. The blend was injection molded into plaques, which were compression molded for 5-10 min. at 160-70.degree./300

psig. The resulting film (10-20 mils) was soaked in acetone to remove II, rinsed in alc. and H₂O, and dried to give a fibrillated I sheet. The sheet was soaked several hrs. in 85% H₃PO₄ contg. 0.1% NH₄ perfluorocaprylate at 100-10.degree., cooled in the electrolyte, and incorporated between the electrodes of a H-O fuel cell. Improvement of fuel-cell performance was obtained with sheets contg. 5-75 wt. % nonelectron-conducting org. filler, e.g. poly-(chlorotrifluoroethylene), CeO₂, BaSO₄, or SnHPO₄.

NCL 264049000

CC 37 (Plastics Fabrication and Uses)

ST polytetrafluoroethylene sheets; fuel cell matrixes; matrixes fuel cell; desalination membranes; membranes desalination

IT Membranes

(fuel-cell, from fibrillated porous tetrafluoroethylene polymers)

IT Fuel cells

(membranes for, from fibrillated porous tetrafluoroethylene polymers)

IT 9002-84-0, uses and miscellaneous (cellular, fibrillated membranes, for fuel cells)

IT 9011-14-7, uses and miscellaneous (extn. from tetrafluoroethylene polymers contg., for fuel-cell membrane manuf.)

L92 ANSWER 14 OF 17 HCA COPYRIGHT 2000 ACS

68:3603 Coating permeable membranes with electrically conducting metallic films, especially the inside of hollow fiber membranes. Levine, Charles Arthur; Prevost, Alfred L. (Dow Chemical Co.). U.S. US 3351487 19671107, 10 pp. (English). CODEN: USXXAM. APPLICATION: US 19631106.

AB Permeable membranes are plated with an elec.-conducting metallic film by contact of 1 side of the membrane with a metal-ion soln. and the other side with a reducing agent. With cationic membranes, the metal ions permeate the membrane and are uniformly deposited on the surface in contact with the reducing agent. With anionic membranes, the reducing agent permeates to cause metal deposition. The membranes, which are films or hollow fibers, are uniformly plated with reduced waste and are useful in fuel cells. Thus, polyethylene hollow fibers (120 .mu. inside diam.) were chlorosulfonated with 10% ClSO₂OH, hydrolyzed, and washed to give an ion-exchange capacity of 1.5 meq./g. The ends of a treated fiber bundle were potted in epoxy resin and the cast resin was machined to expose the open fibers. The encapsulated fiber ends were mounted in an app. that pumped a reducing soln. through the side of the fibers, while their exteriors were immersed in a plating soln. contg. 3.5 parts AgNO₃, 3 parts H₂O, and sufficient NH₄OH to dissolve initial ppt. The reducing soln. contained PhNHNH₂ 1, EtOH 11, and H₂O 10 parts. After 1.5

hrs., the fiber interiors were plated with an adherent Ag film that did not clog the membran pores and had a resistance of 15 ohms./cm. The exterior surface resistance was 5000 ohms/cm. Similar conducting membranes were prep'd. by plating Ni, Cu, Pt, Pd, and Au on film or fiber membranes of Nalfilm I and II, sulfonated nylon (Accropore 5A 6404 Resin), and 3:7 polyethylene-zeolite mixts. Rochelle salt, a NaOH-HaSH.2H2O-NaH2PO2.H2O mixt., Na2S2O4, a KOH-N2H4.H2SO4-N2H4.H2O mixt., and N2H4.H2O were used as reducing agents.

- NCL 117227000
 CC 37 (Plastics Fabrication and Uses)
 ST COPPER LINING PLASTIC FIBERS; GOLD LINING PLASTIC FIBERS;
FUEL CELL FIBER MEMBRANES; NICKEL LINING
 PLASTIC FIBERS; SILVER LINING POLYETHYLENE FIBERS; METAL COATING
 PERMEABLE FIBERS; FIBERS PERMEABLE METAL COATING; PLATINUM LINING
 PLASTIC FIBERS; PERMEABLE FIBERS METAL COATING; PALLADIUM LINING
 PLASTIC FIBERS; POLYETHYLENE FIBERS METAL LINING
- IT **Membranes**
 (fuel-cell, from hollow fibers lined with
 electrically conducting films)
- IT Fiber, synthetic
 (hollow, lined with electrically conducting metallic films, for
 membranes for fuel cells)
- IT Fuel cells
 (membrane for, with hollow fibers, lined with
 electrically conducting films)
- IT Anion exchangers, uses and miscellaneous
 (membranes, and hollow fibers therefrom, coated with
 electrically conducting metallic films, for fuel
 cells)
- IT Cation exchangers, uses and miscellaneous
 (sulfonated, membranes from hollow fibers of, lined
 with electrically conducting films, for fuel
 cells)
- IT Nylon, uses and miscellaneous
 (sulfonated, permeable membranes from, coated with
 electrically conducting metallic films, for fuel
 cells)
- IT 7440-02-0, uses and miscellaneous 7440-05-3, uses and
 miscellaneous 7440-06-4, uses and miscellaneous 7440-22-4, uses
 and miscellaneous 7440-50-8, uses and miscellaneous 7440-57-5,
 uses and miscellaneous
 (coatings and linings of, on membranes and hollow
 fibers, for fuel cells)
- IT 9002-88-4, uses and miscellaneous
 (sulfonated, membranes from hollow fibers of, lined
 with electrically conducting films, for fuel
 cells)

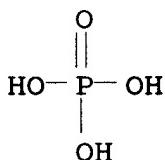
- AB (English). CODEN: USXXAM. APPLICATION: US 19640326.
 The title resin having increased flexibility and a lower shrinkage factor on dehydration are prep'd. by reaction of an alkaryl polyether, $\text{PhO}[(\text{CH}_2)_n\text{O}]_x\text{Ph}$, with concd. H_2SO_4 , oleum, or chlorosulfonic acid, treating the sulfonated deriv. with an aldehyde-releasing compd. to polymerize and crosslink it, and curing for 1-2 hrs. at 85-95.degree.. The cationic ion-exchange resins and membranes are used as electrolytes in fuel cells, as membranes in electrodialysis cells, in the desalination of water, in purification of radioactive wastes, in desalination of sugar juices, preparative org. chemistry, and ion-exchange and purification processes. Thus, 1 mole 1,2-diphenoxymethane and 2 moles concd. H_2SO_4 were heated for 2 hrs. at 145.degree., 20 g. of the resulting 1,2-diphenoxymethanesulfonic acid treated with 8 g. 37% HCHO , and the mixt. cast between 2 glass plates and heated for 2 hrs at 90.degree. to give a membrane having an ion-exchange capacity of 2.9 meq./dry g. and sp. resistivity of the fully hydrated membrane 7.5 ohm-cm. A resin having even greater flexibility was prep'd. by using a monomer having a dimeric oxyethylene bridge between the terminal Ph groups, i.e. $(\text{PhOCH}_2\text{CH}_2)_2\text{O}$.
- NCL 260002200
- CC 36 (Plastics Manufacture and Processing)
- ST CATION EXCHANGE RESINS PLASTICIZED; ACID; RESINS CATION EXCHANGE PLASTICIZED; MEMBRANES ELECTRODIALYSIS CELLS; FUEL CELL ELECTROLYTES; WATER DESALINATION MEMBRANES; RADIOACTIVE WASTE PURIFN; ELECTRODIALYSIS CELLS MEMBRANES; SUGAR JUICE DESALINATION; PLASTICIZED CATION EXCHANGE RESINS; DESALINATION MEMBRANES; ALKARYL POLYETHERS VS SULFURIC
- IT Membranes
 (cation-exchanging, from sulfonated aralkyl polyether polymers with formaldehyde)
- IT Cation exchangers, preparation
 (membranes, from sulfonated aralkyl polyether polymers with formaldehyde)
- IT Benzenesulfonic acid, (ethylenedioxy)di-, polymer with formaldehyde
 Benzenesulfonic acid, [oxybis(ethyleneoxy)]di-, polymer with formaldehyde
 (as cation-exchanging membranes)
- L92 ANSWER 16 OF 17 HCA COPYRIGHT 2000 ACS
 67:60365 Fuel cell with matrix. Hamlen, Robert Paul
 (General Electric Co.). Fr. FR 1474667 19670324, 5 pp. (French).
 CODEN: FRXXAK. PRIORITY: US 19650406.
- AB H_3PO_4 is the main ionic conductor of the fuel cell. The solid ingredients are insol. compds. of Group IVB. These are mixed with water to form a gel or a mortar which is poured into a mold, and allowed to dry in the green state. Then, it is fired at 380-800.degree. to form a matrix, which is impregnated with H_3PO_4 . Polymd. fluorocarbons are generally added as a constituent of the matrix to increase the

resilience. In this case, a metallic oxide of Group IV B is treated with an excess of H₃PO₄, and the polymd. fluorocarbon is added while mixing as a colloidal aq. dispersion or powder. An efficient method consists in cooling the mixt. at the liquid N temp., then crushing, spreading the powder, pressing for 2 min. when cold under 1400 kg./cm.², and then under 105 kg./cm.² at 350.degree.. When a group other than H₃PO₄ is desired, an oxide of a Group IVB metal is treated with arsenate, tungstate, silicate, or molybdate in their acid state. The porosity can be increased by incorporation of a sol. salt (NaCl) which is then dissolved out. The voids are filled with H₃PO₄. The proportion of H₃PO₄ is 10-90%. Conventional electrocatalysts are used. They are bound to the electrolytic part, with a metallic current collector, by pressing at 1.75-21 kg./cm.² and ambient temp. to 350.degree.. Thus, a mixt. contg. H₃PO₄ (sp. gr. 1.87) 65%, ZrO₂ 23, poly(tetrafluoroethylene) (PTFE) 21% (the rest water) is allowed to dry at 150.degree. for 16 hrs. The rubber-like residue is cooled with liquid N₂ and crushed. The powder is spread on the plate of a press (50 mm.) and pressed at 9000 kg. for 2 min. at ambient temp., into a 1-mm. thick plate. Black Pd (85% by wt.) is mixed with PTFE (15%), then spread between 2 Al sheets, pressed at 45 kg. and 350.degree.. Al is dissolved in H₃PO₄, and both membrane and electrode are set into a fuel cell. Pt wire netting is used as a current collector, in contact with the electrode. The specific resistance of the cell at 150.degree. was 27 ohm-cm. With H₂ and O₂ as fuels, the potential at open circuit was 0.67v., and 0.32v. for 60 ma./cm.² at 150.degree..

IT 7664-38-2, uses and miscellaneous
 (impregnation by, of zirconium oxide (ZrO₂) matrix for
 fuel cells)

RN 7664-38-2 HCA

CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



IC H01M

CC 77 (Electrochemistry)

ST FUEL CELL MATRIX; MATRIX FUEL

CELL

IT Fuel cells
 (with matrix of zirconium oxide (ZrO₂) bonded with
 tetrafluoroethylene polymers and impregnated with phosphoric
 acid)

IT 9002-84-0, uses and miscellaneous
 (fu l-c ll matrix of zirconium oxide (ZrO₂)

- IT impregnated with phosphoric acid and bonded with)
 IT 1314-23-4, uses and miscellaneous
 (fuel-cell matrix, bonded with
 tetrafluoroethylene polymers and impregnated with phosphoric
 acid)
 IT 7664-38-2, uses and miscellaneous
 (impregnation by, of zirconium oxide (ZrO₂) matrix for
 fuel cells)

L92 ANSWER 17 OF 17 HCA COPYRIGHT 2000 ACS
 66:3379 Molded electrodes. Langer, Stanley H.; Landi, Henry
 P. (American Cyanamid Co.). U.S. US 3282738 19661101, 4 pp.
 (English). CODEN: USXXAM. APPLICATION: US 19630228.

AB A process is described for making molded catalytic
 electrodes useful in fuel cells such as
 H₂-O contg. gas fuel cells. Thus, a
 mixt. of Pt black 91 and 10% aq. polyethylene 9 parts contg.
 nonylphenol-ethylene oxide emulsifier was spread over a stainless
 steel wire cloth held on a sheet of plate glass. The cloth was
 transferred to blotter paper for initial drying. From the material
 which passes through the cloth onto the glass plate was used the
 final surfacing of the electrode sheet. The sheet was placed on a
 fresh blotter and dried in a desiccator. The sheet was pressed 10
 min. at 85.degree./300 psi. An electrode was cut from the sheet and
 tested as a H₂ and O electrode against standard Pt black electrodes
 in an exptl. fuel cell contg. a membrane
 consisting of filter paper satd. with 2N H₂SO₄. At
 current d. 74 ma./cm.², the voltage recorded was 0.7 v. as a H₂
 electrode and 36 ma./cm.² as an O electrode. A mixt. of Pt and Cr
 acetylacetone can also be used as a catalyst.

- NCL 136120000
 CC 37 (Plastics Fabrication and Uses)
 ST POLYETHYLENE MOLDED ELECTRODES; ELECTRODES MOLDED
 POLYETHYLENE
 IT Fuel cells
 (electrodes for, from platinum black with ethylene polymer
 binders)
 IT Electrodes
 (from platinum black with ethylene polymer binder, for
 fuel cells)
 IT 2,4-Pentanedione, chromium complex
 (electrodes (catalytic) from platinum black and, for fuel
 cells)
 IT 7440-06-4, uses and miscellaneous
 (black, electrodes for fuel cells from)
 IT 13681-82-8
 (electrodes (catalytic) from platinum black and, for fuel
 cells)
 IT 9002-88-4, uses and miscellaneous
 (electrodes for fuel cells from platinum
 black and)
 IT 7782-44-7, uses and miscellaneous

(fu l c lls, with hydrogen,
platinum black electrodes contg. ethylene polymers for)
IT 1333-74-0, uses and miscellaneous
(fuel cells, with oxygen, platinum black
electrodes contg. ethylene polymers for)

=> d 195 1-7 cb1b abs hitstr hitind

L95 ANSWER 1 OF 7 HCA COPYRIGHT 2000 ACS
130:260528 Polymer-based ionic conductor material. Gandon, Christophe;
Fix, Renaud (Saint Gobain Vitrage S.A., Fr.). Fr. Demande FR
2767743 A1 19990305, 31 pp. (French). CODEN: FRXXBL. APPLICATION:
FR 1997-10973 19970903.

AB The invention concerns a polymer-based ionic conductor layer on which is assocd. .gtoreq.1 peelable film. The invention equally concerns the process of fabrication of this material, notably by extrusion or by coating, and the process of fabrication of electrochem. devices comprising this material. Claimed polymers include thermoplastics, elastomers, thermocrosslinkable in the form of a gel, more specifically polyoxyalkylenes of type POE, POP, PEI, BPRI, polyvinylpyrrolidone, polyamides or acrylates, PVA, polyethylene succinate, polymethylene sulfide, polyethylene adipate, poly-.beta.-propiolactone, **polyphosphazene**, polyacrylonitrile, poly(divinylidene fluoride), polyvinylbutyral, polystyrene, polybutadiene, PMMA, cellulose acetate, polyfluorocarbons, poly(ethyloxazoline), poly(iso-butylmethacrylate), poly-tert-butylmethacrylate, polyenaminonitrile, poly-4-vinylpyridine, phenylene polysulfide sulfonic acid, polyether-ether ketones poly-p-phenylene, polyphenylene sulfide, these last 3 polymers able to be or not to be sulfonates, polyphosphonate esters such as polydimethylphenylene oxide phosphonate and sulfonated polysulfones. Claimed application include use in electrochem. devices, battery energy storage, fuel cells, gas sensors, electrochromic glazing/glasses, and retro-viewfinders.

IC ICM B32B007-06
ICS B32B027-06; B32B031-30; C03C017-32; B29C047-02; H01M002-16

CC 76-2 (Electric Phenomena)

Section cross-reference(s): 36, 52, 72

ST polymer based ionic conductor; electrochem device polymer based ionic conductor; battery polymer based ionic conductor; fuel cell polymer based ionic conductor; gas sensor polymer based ionic conductor; glazing electrochromic polymer based ionic conductor; glass electrochromic polymer based ionic conductor; retro viewfinder polymer based ionic conductor

IT Antioxidants

Coating process

Conducting polymers

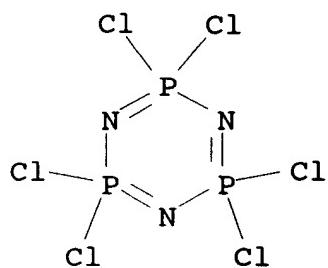
Electrochromic materials

Electrolytes
 Extrusion of polymeric materials
Fu l c lls
 Fungicides
 Gas sensors
 Lubricants
 Plasticizers
 Primary batteries
 Secondary batteries
 Surfactants
 Thixotropic agents
 (polymer-based ionic conductor material)
IT Acrylic polymers, processes
 Fluoropolymers, processes
Phosphazenes
 Polyamides, processes
 Polycarbonates, processes
 Polyesters, processes
 Polyolefins
 Polyoxyalkylenes, processes
 Polysiloxanes, processes
 Polythiophenylenes
 Polyvinyl butyrals
 Sulfonates
 Synthetic rubber, processes
 Thermoplastics
 (polymer-based ionic conductor material)

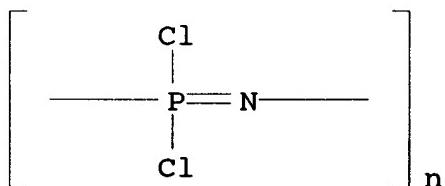
L95 ANSWER 2 OF 7 HCA COPYRIGHT 2000 ACS
130:84063 ~~Gas-diffusion electrodes using polyphosphazenes for fuel cells.~~ Saito, Akira (Japan Storage Battery Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 11003715 A2 19990106 Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-168131 19970609.
AB The title electrodes comprise **polyphosphazenes** as water-repellent agents. The electrodes are obtained by simple process without using surfactants.
IT **25231-98-5D**, Hexachlorocyclotriphosphazene homopolymer, alkoxy group-contg. **26085-02-9D**, Poly(dichlorophosphazene), alkoxy group-contg. (gas-diffusion electrodes using **polyphosphazene** water-repellent agents for fuel cells)
RN 25231-98-5 HCA
CN 1,3,5,2,4,6-Triazatriphosphorine, 2,2,4,4,6,6-hexachloro-2,2,4,4,6,6-hexahydro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 940-71-6
CMF C16 N3 P3



RN 26085-02-9 HCA
 CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



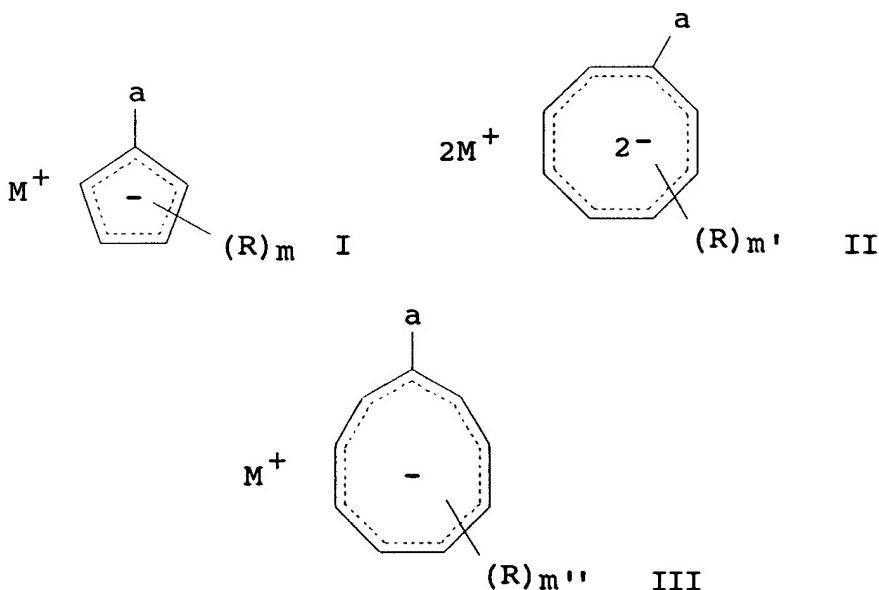
IC ICM H01M004-86
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST polyphosphazene water repellent fuel
 cell electrode; gas diffusion electrode
 polyphosphazene
 IT Polyphosphazenes
 (amino; gas-diffusion electrodes using polyphosphazene
 water-repellent agents for fuel cells)
 IT Polyphosphazenes
 (fiber, fluorine and ethoxy-contg.; gas-diffusion electrodes
 using polyphosphazene water-repellent agents for
 fuel cells)
 IT Polyphosphazenes
 (fluorine-contg., alkoxy-contg.; gas-diffusion electrodes using
 polyphosphazene water-repellent agents for fuel
 cells)
 IT Fuel cell electrodes
 (gas-diffusion electrodes using polyphosphazene
 water-repellent agents for fuel cells)
 IT Polyphosphazenes
 (methoxy; gas-diffusion electrodes using polyphosphazene
 water-repellent agents for fuel cells)
 IT Fluoropolymers, uses
 (polyphosphazene-, alkoxy-contg.; gas-diffusion
 electrodes using polyphosphazene water-repellent agents
 for fuel cells)
 IT Synthetic polymeric fibers, uses
 (polyphosphazene, fluorine and ethoxy-contg.;
 gas-diffusion electrodes using polyphosphazene)

IT water-repellent agents for fuel c 11s)
25231-98-5D, Hexachlorocyclotriphosphazene homopolymer,
 alkoxy group-contg. **26085-02-9D**,
 Poly(dichlorophosphazene), alkoxy group-contg.
 (gas-diffusion electrodes using polyphosphazene
 water-repellent agents for fuel cells)

L95 ANSWER 3 OF 7 HCA COPYRIGHT 2000 ACS

125:119530 Ion-conductive polymers for electrochemical devices.
 Rosenmeier, Lars; Knutz, Boye Cornils (Danacell Aps, Den.). PCT
 Int. Appl. WO 9617359 A1 19960606, 42 pp. DESIGNATED STATES: W:
 AL, AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DE, DK,
 DK, EE, EE, ES, FI, FI, GB, GE, HU, IS, JP, KE, KG, KP, KR, KZ, LK,
 LR, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU; RW:
 AT, BE, BF, BJ, CF, CG, CH, CI, CM, DE, DK, ES, FR, GA, GB, GR, IE,
 IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN:
 PIXXD2. APPLICATION: WO 1995-DK484 19951130. PRIORITY: DK
 1994-1370 19941201.

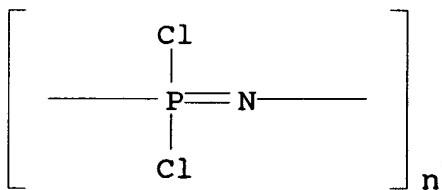
GI



AB An ion-conductive polymer, suited for use as an electrolyte in
 electrochem. devices, e.g., rechargeable batteries, fuel
 cells, contg. covalently bound ion complexes of one of
 formulas I, II, or III (M⁺ is H⁺, Li⁺, Na⁺, or K⁺; m is an integer
 in the range 0-4; m' is an integer in the range 0-7; m'' is an
 integer in the range 0-8; and each R independently is halogen;
 -CO-O-, M⁺, or -SO₂-O-, M⁺; cyano; nitro; C1-5 alkoxy; optionally

substituted Ph or phenoxy; -CONR₅R₆ or -NR₅R₆ where R₅ and R₆ independently are hydrogen, C₁-5 alkyl, optionally substituted Ph, phenylcarbonyl, or C₁-6 alkanoyl; -N(R₅)-CO-R₇ where R₇ is hydrogen, C₁-5 alkyl, C₂-5 alkenyl, C₂-5 alkynyl, or optionally substituted phenyl; R₇-CO-, R₇-O-CO-, R₇-CO-O-, or R₇-O-CO-O-; cycloheptatrienyl; or a group further specified).

- IT 26085-02-9D, Poly(dichlorophosphazene), reaction products with polyethoxylated compds. and lithium cyclopentadienylide derivs. (ion-conductive polymers as electrolyte for electrochem. devices)
- RN 26085-02-9 HCA
- CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



- IC ICM H01B001-12
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
- IT 9004-74-4D, reaction products with ethoxylated polysiloxanes
26085-02-9D, Poly(dichlorophosphazene), reaction products with polyethoxylated compds. and lithium cyclopentadienylide derivs.
132408-80-1D, reaction products with ethoxylated polysiloxanes
179074-70-5D, reaction products with ethoxylated polysiloxanes
179074-71-6D, reaction products with ethoxylated polysiloxanes
179074-72-7D, reaction products with ethoxylated polysiloxanes
179074-73-8D, reaction products with ethoxylated polysiloxanes
179074-74-9D, reaction products with ethoxylated polysiloxanes
179074-75-0D, reaction products with ethoxylated polysiloxanes
179074-76-1 179074-77-2 179074-79-4 179077-50-0
179238-41-6D, reaction products with lithium cyclopentadienylide complexes
(ion-conductive polymers as electrolyte for electrochem. devices)

- L95 ANSWER 4 OF 7 HCA COPYRIGHT 2000 ACS
120:307378 Osteoblast culture on bioerodible polymers: studies on initial cell adhesion and spread. Laurencin, Cato T.; Morris, Carol D.; Pierre-Jacques, Henri; Schwartz, Edith R.; Keaton, Altorous R.; Zou, Ligan (Div. Health Sci. Technol., Massachusetts Inst. Technol., Cambridge, MA, USA). Polym. Adv. Technol., 3(6), 359-64 (English) 1992. CODEN: PADTE5. ISSN: 1042-7147.

- AB The development of systems for the growth of osteoblasts on bioerodible polymeric matrixes was explored. Three classes of bioerodible polymers were studied as possible matrix supports for osteoblast growth: the poly(anhydrides), poly(phosphazene)s and poly(lactic acid/glycolic acid) copolymers. Neonatal calvarial cells from Sprague-Dawley rats were

seeded onto polymer disks at a d. of 1 .times. 104 cells/cm². Initial attachment and spreading, rate of growth and morphol. were detd., and retention of osteoblast-like phenotype was assessed through measurements of alk. phosphatase activity in the presence and absence of 1,25-dihydroxyvitamin D3. All results were considered relative to tissue culture polystyrene. Cells were found to attach to all polymers at 8 h post-seeding. By 24 h, cell nos. on all polymers were found to be decreased, except for poly(lactic acid/glycolic acid). Rat calvarial osteoblasts seeded on poly(lactic acid/glycolic acid) reached confluence and retained their phenotype. Successful construction of viable osteoblast-bioerodible polymer composite materials, as presented in the authors' study, may find their usefulness as grafts for atrophic non-unions of bone, for healing craniofacial and other defects and for use as prosthetic implants or coatings. Composite systems of osteoblast cultures may also find their usefulness in furthering the authors' understanding of bone differentiation, maturation and metab. in a matrix environment.

CC 63-7 (Pharmaceuticals)

L95 ~~ANSWER 5 OF 7 HCA~~ COPYRIGHT 2000 ACS

93:242741 Cell and fuel cell electrodes

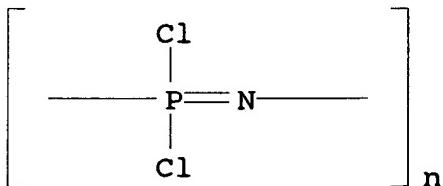
having a poly(phosphazene) binder. Auburn, James J. (Bell Telephone Laboratories, Inc., USA). U.S. US 4223080 19800916, 4 pp. (English). CODEN: USXXAM. APPLICATION: US 1979-38347 19790511.

AB Battery or fuel-cell electrodes are prep'd. from an active electrode material and a poly(phosphazene) binder. Thus, the preps. of C, V6013, and TiS₂ electrodes from mixts. contg. the resp. active electrode material and poly[bis(trifluoroethoxy)-phosphazene] binder are reported.

IT 26085-02-9D, reaction products with sodium trifluoroethoxide or sodium phenate
(binders, electrodes contg., battery or fuel-cell)

RN 26085-02-9 HCA

CN Poly[nitrilo(dichlorophosphoranylidyne)] (8CI, 9CI) (CA INDEX NAME)



IC H01M006-14

NCL 429194000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 37

ST electrode battery **polyphosphazen** binder; fu 1
 cell electrode **polyphosphazene** binder; carbon
 electrode **polyphosphazen** binder; vanadium oxide electrode
polyphosphazene binder; titanium disulfide electrode
polyphosphazene binder

IT Electrodes
 (battery, fuel-cell, contg. **poly(phosphazene)** binder)

IT 139-02-6D, reaction products with poly(dichlorophosphazene)
 420-87-1D, reaction products with poly(dichlorophosphazene)
26085-02-9D, reaction products with sodium trifluoroethoxide
 or sodium phenate
 (binders, electrodes contg., battery or fuel-cell)

IT 7440-44-0, uses and miscellaneous 12037-42-2 12039-13-3
 (electrodes, contg. **poly(phosphazene)** binder,
 battery or fuel-cell)

L95 ANSWER 6 OF 7 HCA COPYRIGHT 2000 ACS

90:124662 Electrodes for fuel cell or air-metal batteries. Yoshida, Motoko; Ohbayashi, Hidehito; Kudo, Tetsuichi (Hitachi, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 53139143 19781205 Showa, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1977-53059 19770511.

AB An elec. conducting porous substrate is impregnated with a polymer-org. solvent soln. and dried to prep. a water-repellent gas electrode. Thus, a sintered Nd0.9Sr0.1CoO₃ was impregnated in a [NP(OCH₂CF₃)₂]_n-THF soln. and dried. The electrode withstood >500 charge-discharge cycles in an air battery contg. a Pt electrode and a 30% KOH electrolyte. A PTFE-impregnated electrode withstood <100 charge-discharge cycles.

IC H01M004-88

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 Section cross-reference(s): 37

ST electrode **phosphazene** polymer fuel cell

IT **Phosphazene polymers**

(fluoroalkoxy and alkoxy, oxide electrodes impregnated with, battery or fuel-cell)

IT Electrodes

(battery, **phosphazene** polymer-impregnated oxide)

IT Electrodes

(fuel-cell, **phosphazene** polymer-impregnated oxide)

IT 53096-06-3

(electrodes, battery or fuel-cell, **phosphazene** polymer-impregnated)

L95 ANSWER 7 OF 7 HCA COPYRIGHT 2000 ACS

77:42467 Electrodes comprising a fluorinated phosphonitrile polymer for use in fu 1 cells. Palmer, Nigel I. (Leesona

Corp.). U.S. US 3660165 19720502, 6 pp. (English). CODEN: USXXAM.
APPLICATION: US 1970-30948 19700422.

AB Lightwt. electrodes were prepd. from an admixt. of catalyst and a fluorinated phosphonitrile polymer. The backing layer can be a continuous film or particulate polymer composed of hydrophobic fluorinated phosphonitrile and its derivs. or poly(tetrafluoroethylene). The electrode is adapted to be disposed in an electrochem. cell with the catalytic layer in contact with the cell electrolyte.

IT 37002-15-6

(in fuel-cell cathodes, with platinum catalysts)

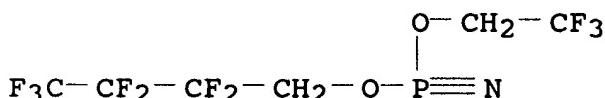
RN 37002-15-6 HCA

CN Metaphosphimic acid (H_2PO_2N), 2,2,3,3,4,4,4-heptafluorobutyl 2,2,2-trifluoroethyl ester, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 45241-25-6

CMF C6 H4 F10 N O2 P



IC H01M

NCL 136086000D

CC 77-2 (Electrochemistry)

ST fluorinated phosphonitrile polymer fuel cell;
PTFE fuel cell

IT Cathodes

(fuel-cell, platinum catalysts with
fluorinated phosphonitrile polymer)

IT 7440-06-4, uses and miscellaneous
(catalysts, fuel-cell, with fluorinated
phosphononitrile polymer)

IT 37002-15-6

(in fuel-cell cathodes, with platinum
catalysts)

=> d 193 1-15 ti

L93 ANSWER 1 OF 15 HCA COPYRIGHT 2000 ACS

TI Proton-conducting polymer membrane
based on sulfonated polystyrene microspheres and an amphiphilic
polymer blend

L93 ANSWER 2 OF 15 HCA COPYRIGHT 2000 ACS

TI FTIR study of water in cast Nafion films

- L93 ANSWER 3 OF 15 HCA COPYRIGHT 2000 ACS
TI Preparation of perfluorocarbon polymers containing phosphonic acid groups
- L93 ANSWER 4 OF 15 HCA COPYRIGHT 2000 ACS
TI Gas transport properties in copolyarylates of 4,4'-biphenyldicarboxylic acid with phenolphthalein and tetrabromophenolphthalein
- L93 ANSWER 5 OF 15 HCA COPYRIGHT 2000 ACS
TI Effects of protonation on the transport of hydrophobic nitrogen heterocycles through perfluorosulfonate ionomer membranes
- L93 ANSWER 6 OF 15 HCA COPYRIGHT 2000 ACS
TI Separation of supercritical carbon dioxide and ethanol mixtures with an asymmetric polyimide membrane
- L93 ANSWER 7 OF 15 HCA COPYRIGHT 2000 ACS
TI ATP-driven calcium/hydrogen ion antiport in acid vesicles from Dictyostelium
- L93 ANSWER 8 OF 15 HCA COPYRIGHT 2000 ACS
TI Preparation of functional polymeric membranes for proton driven ion transport
- L93 ANSWER 9 OF 15 HCA COPYRIGHT 2000 ACS
TI Manufacturing of proton conductor film having improved conductivity
- L93 ANSWER 10 OF 15 HCA COPYRIGHT 2000 ACS
TI The membrane potential of the cellular slime mold Dictyostelium discoideum is mainly generated by an electrogenic proton pump
- L93 ANSWER 11 OF 15 HCA COPYRIGHT 2000 ACS
TI Preparation of N-methoxymethylated nylon-3 and application of its membrane to pervaporation of water-alcohol mixture
- L93 ANSWER 12 OF 15 HCA COPYRIGHT 2000 ACS
TI Active and selective transports of alkali metal ions through the polyelectrolyte complex membrane consisting of methyl glycol chitosan, (carboxymethyl)dextran and poly(vinyl sulfate)
- L93 ANSWER 13 OF 15 HCA COPYRIGHT 2000 ACS
TI Development of ion-exchange membrane for an artificial kidney system
- L93 ANSWER 14 OF 15 HCA COPYRIGHT 2000 ACS
TI Active hydrogen exchange reaction of poly(.gamma.-methyl L-glutamate) membrane with deuterium oxide and movement of

diffusion of water in the membrane

L93 ANSWER 15 OF 15 HCA COPYRIGHT 2000 ACS
 TI Active proton transport across the surface membrane of the slime mold *Physarum polycephalum*

=> d 193 1,8,9 cbib abs hitstr hitind

L93 ANSWER 1 OF 15 HCA COPYRIGHT 2000 ACS
 133:90336 proton-conducting polymer membrane

based on sulfonated polystyrene microspheres and an amphiphilic polymer blend. Hong, Liang; Chen, Ningping (Department of Chemical & Environmental Engineering, National University of Singapore, Singapore, 119260, Singapore). J. Polym. Sci., Part B: Polym. Phys., 38(11), 1530-1538 (English) 2000. CODEN: JPBPEM. ISSN: 0887-6266. Publisher: John Wiley & Sons, Inc..

AB A new type of amphiphilic polymer blend comprising polystyrene (PS), polyethylene oxide (PEO) and microspheres of crosslinked polystyrene sulfonic acid (PSSA) was prepd. by soln. blending and followed by casting. Besides providing protons, PSSA plays a role in enhancing the miscibility of polystyrene (PS) and polyethylene oxide (PEO) according to the IR and the DSC studies. The resulting polymer blend is a proton electrolyte. The influence of the mixing extent between PS and PEO on the proton cond. has been studied. It is also found that for those samples in which PEO and PS mix well, the hydrophobic PS component can effectively prevent water evapn. from the hydrophilic components at elevated temps., and therefore preserve the proton cond. (10^{-4} S/cm) at the temp. as high as 80.degree.C.

CC 38-3 (Plastics Fabrication and Uses)

ST polystyrene polyoxyethylene microsphere amphiphilic membrane ; crosslinked sulfonated polystyrene microsphere amphiphilic blend; proton conducting membrane amphiphilic polymer blend

IT Hydrogen bond

Membranes, nonbiological

Microspheres

Tensile strength

(proton-conducting polymer membrane

based on sulfonated polystyrene microspheres and an amphiphilic polymer blend)

IT Polyoxalkylenes, uses

(proton-conducting polymer membrane

based on sulfonated polystyrene microspheres and an amphiphilic polymer blend)

IT Polymer blends

(proton-conducting polymer membrane

based on sulfonated polystyrene microspheres and an amphiphilic polymer blend)

IT Ionic conductivity

(proton; proton-conducting polymer

- membrane based on sulfonated polystyrene microspheres and
an amphiphilic polymer blend)
- IT 9003-53-6, Polystyrene
(proton-conducting polymer membrane
based on sulfonated polystyrene microspheres and an amphiphilic
polymer blend)
- IT 25322-68-3, Polyethylene oxide
(proton-conducting polymer membrane
based on sulfonated polystyrene microspheres and an amphiphilic
polymer blend)
- IT 9003-70-7D, Divinylbenzene-styrene copolymer, sulfonated
(proton-conducting polymer membrane
based on sulfonated polystyrene microspheres and an amphiphilic
polymer blend)
- L93 ANSWER 8 OF 15 HCA COPYRIGHT 2000 ACS
113:232960 Preparation of functional polymeric membranes for
proton driven ion transport. Fyles, Thomas
(University of Victoria, Can.). U.S. US 4906376 A 19900306, 9 pp.
Cont. of U.S. Ser. No. 929,288, abandoned. (English). CODEN:
USXXAM. APPLICATION: US 1989-323195 19890313. PRIORITY: CA
1986-505815 19860403; US 1986-929288 19861112.
- AB A functional membrane, useful for proton-driven
ion transport in the recovery of metal ions from solns.
contg. other ions, consists of a blend of 2 components, wherein
component A comprises an active polymer having cation-binding sites
being provided by a crown ether, a cryptand or an acyclic complexone
with an ionizable acidic site, with the active polymer
being incorporated into a polymer backbone via a spacer component;
and component B comprising a support polymer e.g., polyaramides,
polysulfones, and polypiperazine fumaramides. Thus, a
membrane was manufd. by a phase inversion method from a
blend of Nomex (a polyaramide) in AcNMe contg. LiCl and a polymeric
crown ether e.g., poly [(2R,3R-N-(N-propenyl)-2-aminoethyl)-2-
carboxamido-3-carboxyl-1,4,7,10,13, 16-hexaoxacyclooctadecane] soln.
The blend was cast on a glass plate, the solvent was
evapd., and then the polymer film was immersed in cold H₂O to remove
the bulk of the solvent. The functional membrane was
tested with brine showing that the membrane moved K⁺
against its gradient while the H⁺ gradient was still present.
- IC ICM B01D013-00
ICS B01D013-04
- NCL 210500280
- CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 45, 56
- ST membrane proton driven ion transport;
crown ether polymer blend membrane; cryptand polymer bl
membrane; complexone acyclic poly membrane;
polyaramide support m mbrane; polysulfone support
membran ; polypiperazine support membrane
- IT Membran s
(cation binding polymer-polymer support, for proton

IT -driven cation transport, in metal ion extn.)
 IT Polysulfones, uses and miscellaneous
 (supports, for polymeric membranes)
 IT Polyamides, uses and miscellaneous
 (arom., supports, for polymeric membranes)
 IT Crown compounds
 (ethers, polymers, prepn. of, for membranes)
 IT 9006-26-2 9011-13-6
 (in polymeric membrane prepn., for proton
 -driven cation transport)
 IT 130449-07-9
 (membranes, for proton-driven cation
 transport)
 IT 116614-11-0P 116614-12-1P
 (prepn. and use of, in membranes)
 IT 24203-36-9P, Potassium ion, preparation
 (sepn. of, from brine solns., membranes for)
 IT 28470-64-6
 (supports, for polymeric membrane)
 IT 24938-60-1, Nomex 28727-56-2
 (supports, for polymeric membranes)

L93 ANSWER 9 OF 15 HCA COPYRIGHT 2000 ACS
 112:89470 Manufacturing of proton conductor film
 having improved conductivity. Yasuda, Ayumi; Yamaga, Noriyuki
 (Matsushita Electric Works, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP
 01155963 A2 19890619 Heisei, 3 pp. (Japanese). CODEN: JKXXAF.
 APPLICATION: JP 1987-312624 19871210.
 AB The title method involves dipping a film (which has been prep'd. by
 casting a soln. contg. a perfluorosulfonate polymer) in an
 acid, satg. with H₂O, and freeze drying.
 IC ICM B05D001-18
 ICS B01J047-12; B05D007-24; H01B001-12
 CC 76-2 (Electric Phenomena)
 ST proton conductor perfluorosulfonate polymer
 film; freeze drying proton conductor film
 IT Freeze drying
 (in manufg. of proton conductor
 perfluorosulfonate polymer films)
 IT Fluoropolymers
 (proton conductor films, manuf. of)
 IT Electric conductors
 (ionic, proton, perfluorosulfonate polymer films,
 freeze drying in manufg. of)
 IT Cation exchangers
 (membranes, proton conductor films
 from Nafion, manuf. of)

=> d 196 1-19 ti

L96 ANSWER 1 OF 19 HCA COPYRIGHT 2000 ACS

- TI Integral fu l-c ll electrode and matrix and
their manufacture
- L96 ANSWER 2 OF 19 HCA COPYRIGHT 2000 ACS
TI Manufacture of gas-diffusion electrodes
- L96 ANSWER 3 OF 19 HCA COPYRIGHT 2000 ACS
TI Gas-permeable electrode
- L96 ANSWER 4 OF 19 HCA COPYRIGHT 2000 ACS
TI Corrosion of graphite composites in phosphoric acid **fuel**
cells
- L96 ANSWER 5 OF 19 HCA COPYRIGHT 2000 ACS
TI **Fuel cells**
- L96 ANSWER 6 OF 19 HCA COPYRIGHT 2000 ACS
TI Seals for stacked **fuel cells**
- L96 ANSWER 7 OF 19 HCA COPYRIGHT 2000 ACS
TI Electrolyte matrix for **fuel cells**
- L96 ANSWER 8 OF 19 HCA COPYRIGHT 2000 ACS
TI Matrix for **fuel cell**
- L96 ANSWER 9 OF 19 HCA COPYRIGHT 2000 ACS
TI Electrolyte matrix for **fuel cells**
- L96 ANSWER 10 OF 19 HCA COPYRIGHT 2000 ACS
TI Electrolyte matrix for **fuel cells**
- L96 ANSWER 11 OF 19 HCA COPYRIGHT 2000 ACS
TI **Fuel cell** stack
- L96 ANSWER 12 OF 19 HCA COPYRIGHT 2000 ACS
TI Electrolyte vapor condenser
- L96 ANSWER 13 OF 19 HCA COPYRIGHT 2000 ACS
TI **Fuel cell** matrixes
- L96 ANSWER 14 OF 19 HCA COPYRIGHT 2000 ACS
TI New phosphoric acid **fuel cell** electrocatalysts
made from alumina/pyropolymer composites
- L96 ANSWER 15 OF 19 HCA COPYRIGHT 2000 ACS
TI **Fuel cell** electrode
- L96 ANSWER 16 OF 19 HCA COPYRIGHT 2000 ACS
TI Gelled sulfuric acid batteries and **fuel c lls**
- L96 ANSWER 17 OF 19 HCA COPYRIGHT 2000 ACS
TI Carbonaceous **fuel c ll** electrode

L96 ANSWER 18 OF 19 HCA COPYRIGHT 2000 ACS
 TI **Fu l-c ll electrodes**

L96 ANSWER 19 OF 19 HCA COPYRIGHT 2000 ACS
 TI Double-layer oxygen-diffusion electrode for **fuel cells**

=> d 196 1-11,13,15,16,17,18 cbib abs hitstr hitind

L96 ANSWER 1 OF 19 HCA COPYRIGHT 2000 ACS
 109:153102 Integral fuel-cell electrode and matrix
 and their manufacture. Kato, Hiroshi; Komada, Ichiro (Japan
 Gore-Tex, Ltd., Japan). Eur. Pat. Appl. EP 276987 A2 19880803, 9
 pp. DESIGNATED STATES: R: AT, BE, CH, DE, ES, FR, GB, GR, IT, LI,
 LU, NL, SE. (English). CODEN: EPXXDW. APPLICATION: EP 1988-300649
 19880127. PRIORITY: JP 1987-17229 19870129.

AB An integrally **molded**, combined fuel-cell
 electrode and matrix comprise a matrix layer contg. 3-20 %
PTFE and 80-97 % inorg. (SiC, Ta2O5, ZrO2, or C) powder
 formed on 1 side of an electrode layer contg. 40-90 % elec.
 conductive fine C powder supporting a catalyst (Pt) and 10-60 %
PTFE. The layers formed by a paste extrusion
 molding process are laminated by rolling and reduced
 simultaneously to their final thicknesses. An integrally
molded electrode/matrix body of the invention was prep'd.
 with an overall thickness of 0.25, electrod layer thickness of
 .apprx.0.15, and matrix layer thickness of .apprx.0.1 mm. When an
 attempt was made to peel this body at the interface between the 2
 layers, peeling occurred within the matrix layer. Bodies of the
 invention had sufficient strength to withstand handling in
fuel-cell manuf. and had high foam pressure after
 impregnated with **H3PO4**.

IC ICM H01M004-86

ICS H01M004-88; H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell integral electrode matrix; platinum
 carbon electrode matrix unit; silicon carbide matrix electrode unit

IT Electrodes

(fuel-cell, catalytic, platinum, integrally
 olded and combined electrolyte matrix and)

IT 7440-06-4, Platinum, uses and miscellaneous
 (electrodes, catalytic, integrally **molded** and combined
 with electrolyte matrix, for fuel cells)

IT 7440-44-0, Carbon, uses and miscellaneous
 (electrolyte matrix contg., integrally **molded** and
 combined catalytic platinum electrode)

IT 409-21-2, Silicon carbide, uses and miscellaneous 1314-23-4,
 Zirconium oxide, uses and miscellaneous 1314-61-0, Tantalum oxide
 (Ta2O5)
 (electrolyte matrix contg., integrally **bold d** and

combined with catalytic platinum electrode, for fuel cells)

L96 ANSWER 2 OF 19 HCA COPYRIGHT 2000 ACS

108:24635 Manufacture of gas-diffusion electrodes. Motoo, Satoru; Watanabe, Masahiro; Furuya, Choichi (Tanaka Noble Metal Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 62249360 A2 19871030 Showa, 3 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1986-92545 19860422.

AB Hydrophilic and hydrophobic carbon powders are mixed with a hydrophobic binder, hot pressed, and cooled rapidly or cooled slowly with pressing to obtain gas-diffusion electrodes. Thus, hydrophilic C powders (av. size 400 .ANG.) 7, hydrophobic C powders (av. size 400 .ANG.) 7, and PTFE powder (av. size 0.2 .mu.) 6 parts were mixed in a dispersing liq., dried, 1.2 g of the dried mixt. powder was pressed in a 100 .times. 100-nm mold at 600 kg/cm² and 360.degree. for 5 s, the pressed sheet was cooled to .apprx.25.degree. in 5 s to obtain a 0.1 .times. 100 .times. 100-mm gas-diffusion electrode. When loaded with Pt at 0.56 mg/cm² and used in H₂SO₄ at 60.degree., this electrode had a polarization of 25 mV (vs. H ref. electrode) for H oxidn. at 3 mA/cm² and polarizations of 800 and 750 mV (vs. H ref. electrode) for O redn. at 0.6 and 2 A/cm², resp. Electrodes of the invention are useful for fuel cells, secondary batteries, electrochem. reactors, and electroplating, and can be used with or without a current collector (hydrophobic carbon sheet).

IT 9002-84-0, PTFE

(mixts. contg., hydrophobic and hydrophilic powd. carbon, gas-diffusion electrodes from)

RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



IC ICM H01M004-88

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

IT Electrodes

(gas-diffusion from mixts. of hydrophobic and hydrophilic powd. carbon and PTFE)

IT 7440-06-4, Platinum, uses and miscellaneous

(electrodes, catalytic, gas-diffusion, from mixts. of hydrophobic and hydrophilic powd. carbon and PTFE)

IT 9002-84-0, PTFE

- (mixts. contg., hydrophobic and hydrophilic powd. carbon,
gas-diffusion electrodes from)
- IT 7440-44-0, Carbon, uses and miscellaneous
(mixts. of hydrophobic and hydrophilic powd., contg. PTFE
, gas-diffusion electrodes from)
- L96 ANSWER 3 OF 19 HCA COPYRIGHT 2000 ACS
107:239800 Gas-permeable electrode. Watanabe, Masahiro; Motoo, Satoshi;
Furuya, Nagakazu (Tanaka Noble Metal Industrial Co., Ltd., Japan).
Eur. Pat. Appl. EP 241432 A2 19871014, 50 pp. DESIGNATED STATES: R:
DE, FR, GB, IT, NL. (English). CODEN: EPXXDW. APPLICATION: EP
1987-830085 19870305. PRIORITY: JP 1986-50018 19860307; JP
1986-75238 19860401; JP 1986-76891 19860403.
- AB The electrode for fuel or electrolytic cells,
comprises a gas permeable layer and a reaction layer which has
hydrophobic and hydrophilic portions. Electrolyte penetrates into
the reaction layer and does not penetrate into the gas permeable
layer, and only the gas produced on or supplied to the electrode
penetrates into the gas permeable layer, and the reaction surface is
never covered with the gas. Thus a 6:4 PTFE-carbon black
gas permeable layer attached with a Cu mesh was attached to a
reaction layer of conductive particles loaded with 2 mg Pt and 1 mg
Ru/cm², and a hydrophobic binder by press molding, and 2M
H₂SO₄ was impregnated into the hydrophilic portion of the
reaction layer to obtain an anode. A MeOH fuel
cell using this anode and a 2M aq. MeOH fuel supplied to the
hydrophobic surface of the anode had a c.d. of 200 mA/cm² at
60.degree. and 0.4 V and a limiting c.d. of 1200 mA/cm² vs. 40 and
300 mA/cm² for a cell using an anode without the gas permeable
layer.
- IC ICM H01M004-86
ICS C25B011-03
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
- ST methanol fuel cell anode; fuel
cell gas diffusion anode
- IT Anodes
(porous, catalytic, for fuel and electrolytic
cells)
- L96 ANSWER 4 OF 19 HCA COPYRIGHT 2000 ACS
107:202060 Corrosion of graphite composites in phosphoric acid
fuel cells. Christner, L. G.; Dhar, H. P.;
Farooque, M.; Kush, A. K. (Energy Res. Corp., Danbury, CT, 06810,
USA). Corrosion (Houston), 43(9), 571-5 (English) 1987. CODEN:
CORRAK. ISSN: 0010-9312.
- AB Thermoset phenolic resins TPR used in H₃PO₄ fuel
cell components undergo degrdn. which is 50 times higher
than that of thermoplastic resins; the corrosion rate of
TPR-graphite composites varies with resin types and H₃PO₄
absorption. The corrosion rate of the composites depends on the
molding and crack propagation which enhances H₃PO₄

penetration. The corrosion currents for glassy C-graphite-resin composites decrease when the material is heat-treated.

IT 9002-84-0, T flon

(composite contg. graphite and, phosphoric acid corrosion of, fuel cell application in relation to)

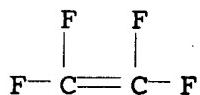
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4

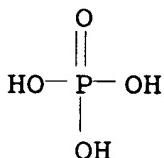


IT 7664-38-2, reactions

(corrosion by, of phenolic resin-graphite composites, fuel cells component application in relation to)

RN 7664-38-2 HCA

CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

ST fuel cell graphite composite corrosion;
phosphoric acid corrosion graphite composite

IT Polysulfones, uses and miscellaneous

(composite contg. graphite and, phosphoric acid corrosion of, fuel cell application in relation to)

IT Fuel cells

(phosphoric acid, resin-graphite and glassy carbon-graphite composites for, corrosion mechanisms of)

IT 9002-84-0, Teflon 9003-35-4, Varcum 29703

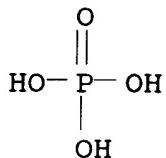
9016-80-2 25667-42-9, Victrex 25839-81-0, Radel 54847-90-4, Udel

(composite contg. graphite and, phosphoric acid corrosion of, fuel cell application in relation to)

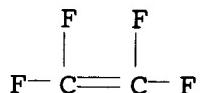
IT 7664-38-2, reactions

(corrosion by, of phenolic resin-graphite composites, fuel cells component application in relation

- to)
- IT 7440-44-0, Carbon, uses and miscellaneous
 (glassy, phenolic resin-graphite composites contg., phosphoric acid corrosion of, fuel cell applications in relation to)
- L96 ANSWER 5 OF 19 HCA COPYRIGHT 2000 ACS
 102:81742 Fuel cells. (Toshiba Corp., Japan). Jpn.
 Kokai Tokkyo Koho JP 59171472 A2 19840927 Showa, 4 pp. (Japanese).
 CODEN: JKXXAF. APPLICATION: JP 1983-44051 19830318.
- AB A fuel cell consists of a pair of gas-diffusion electrodes and a porous electrolyte retainer matrix which is prep'd. from SiC and a H₃PO₄-resistant material. Thus, a mixt. consisting of SiC 216 g, WC 54 g, MeOH 300 mL, 95% H₃PO₄ 190 mL, and a Teflon suspension 62 mL was cast between 2 electrodes to form a matrix of 200 .mu. thickness. The fuel cell had a stable output.
- IC H01M008-02
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
- ST fuel cell electrolyte matrix; silicon carbide matrix fuel cell; tungsten carbide matrix
- IT Fuel cells
 (phosphoric acid, porous electrolyte retainer matrix for, silicon carbide-tungsten carbide)
- IT 12070-12-1
 (fuel-cell porous electrolyte retainer matrix from silicon carbide and)
- IT 409-21-2, uses and miscellaneous
 (fuel-cell porous electrolyte retainer matrix from tungsten carbide and)
- L96 ANSWER 6 OF 19 HCA COPYRIGHT 2000 ACS
 102:48756 Seals for stacked fuel cells. (Sanyo Electric Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 59160978 A2 19840911 Showa, 3 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1983-35667 19830303.
- AB A mixt. of SiC powder, 10-50% fluoropolymer, and H₃PO₄ is rolled to a sheet and heat treated to prep. sealing material for fuel cells. Thus, 5-.mu. SiC contg. 20-30% PTFE [9002-84-0] and .gtoreq. 85% H₃PO₄ .apprx. 200 vol.% of SiC + PTFE was kneaded, cast to a sheet, and heat treated to prep. a sealing material, which was compatible with fuel-cell matrix.
- IT 7664-38-2, uses and miscellaneous
 (seals contg. PTFE-silicon carbide-, for stacked fuel cells)
- RN 7664-38-2 HCA
- CN Phosphoric acid (7CI, 8CI, 9CI) (CA INDEX NAME)



IT 9002-84-0
 (seals contg. phosphoric acid-silicon carbide-, for stacked
 fuel cells)
 RN 9002-84-0 HCA
 CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)
 CM 1
 CRN 116-14-3
 CMF C2 F4



IC H01M008-02
 CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST fuel cell seal silicon carbide; PTFE
 seal fuel cell; phosphoric acid fuel
 cell seal
 IT Seals (mechanical)
 (phosphoric acid-fluoropolymer-silicon carbide, for stacked
 fuel cells)
 IT Fuel cells
 (seals for stacked, phosphoric acid-fluoropolymer-silicon
 carbide)
 IT 7664-38-2, uses and miscellaneous
 (seals contg. PTFE-silicon carbide-, for stacked
 fuel cells)
 IT 409-21-2, uses and miscellaneous
 (seals contg. phosphoric acid-PTFE-, for stacked
 fuel cells)
 IT 9002-84-0
 (seals contg. phosphoric acid-silicon carbide-, for stacked
 fuel cells)

L96 ANSWER 7 OF 19 HCA COPYRIGHT 2000 ACS
 101:195213 Electrolyte matrix for fuel cells.
 (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 59075565 A2
 19840428 Showa, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
 1982-185108 19821021.
 AB A matrix is prep'd. from a mixt. of .alpha.- or .beta.-type Sic or

Si₃N₄ which is treated with a hot acid, .gtoreq.95% H₃PO₄, and a fluoropolymer binder. The acid is HCl, H₂SO₄, H₃PO₄, HNO₃, or HF. Thus, .alpha.- or .beta.-type SiC was treated for 1 h at 150.degree. in 95% H₃PO₄, rinsed, and dried. The SiC 100 parts was mixed with 3 parts PTFE and 95% H₃PO₄ to a paste and the paste was cast to a sheet. The matrix had high H⁺ cond.

IC H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST silicon carbide electrolyte matrix; fuel cell
electrolyte matrix

IT Fuel cells

(phosphoric-acid, silicon carbide electrolyte matrix for,
acid-treated)

IT 409-21-2, uses and miscellaneous
(electrolyte matrix, for phosphoric-acid fuel
cells, acid-treated)

L96 ANSWER 8 OF 19 HCA COPYRIGHT 2000 ACS

101:195212 Matrix for fuel cell. (Toshiba Corp.,
Japan). Jpn. Kokai Tokkyo Koho JP 59075564 A2 19840428 Showa, 5 pp.
(Japanese). CODEN: JKXXAF. APPLICATION: JP 1982-185105 19821021.

AB The title matrix is prep'd. from Si₃N₄, .gtoreq.95% H₃PO₄, and a fluoropolymer. Thus, a 100:3 mixt. of .alpha.-type Si₃N₄ and PTFE formed to a paste with 95% H₃PO₄ was cast to a sheet having a high H-ion cond. and H₃PO₄ retention.

IC H01M008-02

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST fuel cell electrolyte matrix; silicon nitride
electrolyte matrix

IT Fuel cells

(phosphoric-acid, silicon nitride electrolyte matrix for)

IT 12033-89-5, uses and miscellaneous
(electrolyte matrix, for phosphoric-acid fuel
cells)

L96 ANSWER 9 OF 19 HCA COPYRIGHT 2000 ACS

101:195211 Electrolyte matrix for fuel cells.

(Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 59075563 A2
19840428 Showa, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP
1982-185104 19821021.

AB A matrix is prep'd. from a mixt. of .alpha.- or .beta.-type SiC or Si₃N₄, .gtoreq.95% H₃PO₄, and a fluoropolymer binder. The surface of a matrix is coated with a H₃PO₄-compatible film. Thus, .alpha.- or .beta.-type SiC was treated for 1 h in 20% H₃PO₄ and heat treated for 2 h at 300.degree.. The treated SiC 100 parts was mixed with 3 parts PTFE and H₃PO₄ and the mixt. was cast to a sheet. The sheet matrix was mech. strong and had a high H₃PO₄ retention and H⁺ cond. vs. an untreated SiC.

IC H01M008-02

- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST silicon carbide electrolyte matrix; fuel cell
 electrolyte matrix
 IT Fuel cells
 (phosphoric-acid, silicon carbide electrolyte matrix for, heat-
 and acid-treated)
 IT 409-21-2, uses and miscellaneous
 (electrolyte matrix, for phosphoric-acid fuel
 cells, heat- and acid-treated)
- L96 ANSWER 10 OF 19 HCA COPYRIGHT 2000 ACS
 101:154918 Electrolyte matrix for fuel cells.
 (Mitsubishi Electric Corp., Japan). Jpn. Kokai Tokkyo Koho JP
 59056364 A2 19840331 Showa, 4 pp. (Japanese). CODEN: JKXXAF.
 APPLICATION: JP 1982-166231 19820922.
- AB The title matrix is prep'd. with hydrophobic resin fibers coated with
 C, SiC, Si₃N₄, or Zr oxide, and an elec. insulating compd. such as
 SiC or Si₃N₄. Thus, to a dispersion of PTFE fibers and
 0.1-.mu.-size Si₃N₄ 5-.mu.-size .alpha.-SiC was added, and the
 dispersion was cast to a sheet, which was heated at
 300-350.degree. to prep. a matrix with good electrolytic properties
 for H₃PO₄ fuel cells.
- IC H01M008-02
- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST fuel cell electrolyte matrix; silicon carbide
 electrolyte matrix; nitride silicon electrolyte matrix
 IT Fuel cells
 (phosphoric-acid, silicon carbide-silicon nitride electrolyte
 matrix for)
- IT 12033-89-5, uses and miscellaneous
 (electrolyte matrix from silicon carbide-, fuel-
 cell phosphoric-acid)
- IT 409-21-2, uses and miscellaneous
 (electrolyte matrix from silicon nitride-, fuel-
 cell phosphoric-acid)
- L96 ANSWER 11 OF 19 HCA COPYRIGHT 2000 ACS
 99:91089 Fuel cell stack. Ueno, Mitsushi; Maoka,
 Tadanori; Murata, Kenji; Shirogami, Tamotsu (Toshiba Corp., Japan).
 Eur. Pat. Appl. EP 83192 A1 19830706, 20 pp. DESIGNATED STATES: R:
 DE, FR, GB, IT. (English). CODEN: EPXXDW. APPLICATION: EP
 1982-306806 19821220. PRIORITY: JP 1981-212385 19811225; JP
 1982-102810 19820615.
- AB A fuel-cell stack has a plurality of stacked
 unit cells, each consisting of a pair of gas diffusion electrodes
 with a matrix contg. an electrolyte soln. interposed between them,
 with an interconnector having a fuel gas passage on surface and an
 oxidizing gas agent passage on the other surface interposed between
 each pair of adjacent unit cells. One out of every 3-5
 interconnectors is a 1-piece-molded product which has
 .gtoreq.1 cooling pipe embedded in it and which provides an
 excellent cooling effect. The fuel-cell stack

stably provides a high output voltage over a long period of operation time. Thus, a fuel-cell stack was obtained by stacking unit cells with an interconnector interposed between each pair of adjacent unit cells. H₃PO₄ was used as electrolyte, H as fuel gas, and air as oxidizing gas. The electromotive reaction was performed at a c.d. of 200 mA/cm². During the reaction, measurements were made of temp. (t₁) at outlet port of cooling water, surface temp. (t₂) of interconnector having cooling pipes, and max. temp. (t₃) of interconnector. Temp. at inlet port of cooling water was 160.degree.. The resp. values of t₁, t₂, and t₃ were 170, 180, and 195.degree. vs. 165, 195, and 215.degree. for a conventional fuel-cell stacks. The fuel-cell stack according to invention underwent no changes after operating for 1000 h.

IT 9002-84-0

(cooling pipe coated with film of, in fuel-cell stacks)

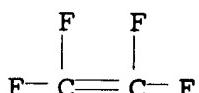
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



IC H01M008-02; H01M008-04

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST fuel cell stack cooling

IT Fuel cells

(stack, contg. interconnectors with embedded cooling pipes)

IT Pipes and Tubes

(cooling, fuel-cell stack interconnectors with embedded)

IT 9002-84-0

(cooling pipe coated with film of, in fuel-cell stacks)

L96 ANSWER 13 OF 19 HCA COPYRIGHT 2000 ACS

95:222940 Fuel cell matrixes. (Sanyo Electric Co.,

Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 56106376 19810824 Showa, 2 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1980-9513 19800129.

AB A mixt. of a matrix material, a sol. material, and a fluorocarbon dispersion is cast, and the sol. material is leached out to prep. a fuel-cell matrix, which is impregnated with H₃PO₄. Thus, a matrix material of SiC

and ZrO₂ was mixed with ZnO (sol. material) and a PTFE dispersion, and the resulting mixt. was rolled and leached with HCl to remove ZnO. The matrix was sandwiched between a cathode and an anode of a H-O fuel cell.

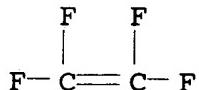
IC H01M008-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST fuel cell electrolyte matrix; silicon carbide
electrolyte matrix; zirconium oxide electrolyte matrix
IT Fuel cells
 (electrolyte matrix for, manuf. of silicon carbide-zirconia)
IT 1314-23-4P, preparation
 (electrolyte matrix from silicon carbide and, manuf. of
 fuel-cell)
IT 409-21-2P, preparation
 (electrolyte matrix from zirconia and, manuf. of fuel-
 cell)

L96 ANSWER 15 OF 19 HCA COPYRIGHT 2000 ACS
74:70923 Fuel cell electrode. Niedrach, Leonard W.;
Zeliger, Harold I. (General Electric Co.). Fr. FR 1596541 19700731,
14 pp. (French). CODEN: FRXXAK. PRIORITY: US 19670803.
AB An aq. emulsion (1 vol.) of 59.6 wt. % Teflon was dild.
with 7 vols. H₂O, and applied to an Al sheet at 120-150.degree.,
then heated to 350.degree. to evap. the emulsifying agent and
agglomerate the Teflon particles. A mixt. of Pt, Na_xWO₃
(x = 0-1), and Teflon powders dild. in H₂O was applied to
the Teflon film; H₂O was then evapd. by heating to
250-350.degree.. The product, useful as an anode in fuel
cells, was completed by a feed manifold, prep'd. from a
similar mixt. of Pt, Na_xWO₃, and Teflon, applied on an Al
sheet and incorporated into the electrode by molding at
350.degree. and 200 kg/-cm². After incorporation, the external Al
sheet was dissolved in a 20% NaOH soln.; the product was then washed
and dried. The prep'd. anode, contg. 34 mg Pt/cm² and Na_xWO₃ (17 wt.
% of the mixt. Pt + Na_xWO₃), showed the best performance when x was
0.9. The fuel cell was completed by a cathode
of Pt black with Teflon binder; O₂ was fed to the cathode
and CO to the anode. 5N H₂SO₄ was used as the electrolyte
at 25.degree..
IT 9002-84-0, uses and miscellaneous
 (coatings of, on aluminum fuel-cell anodes)
RN 9002-84-0 HCA
CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



IC H01M
 CC 77 (Electrochemistry)
 ST fuel cell electrode; electrode fuel
 cell; Teflon fuel cell
 electrode
 IT Fuel cells
 (anodes, platinum- and sodium tungstate-coated aluminum for
 carbon monoxide-oxygen)
 IT Anodes
 (fuel-cell, platinum- and sodium
 tungstate-coated aluminum for carbon monoxide-oxygen)
 IT Coating materials
 (platinum and sodium tungstate, on aluminum fuel-
 cell anodes)
 IT Sodium tungsten oxide, bronze
 (coatings of, on aluminum fuel-cell anodes)
 IT 7440-06-4, uses and miscellaneous 9002-84-0, uses and
 miscellaneous
 (coatings of, on aluminum fuel-cell anodes)

L96 ANSWER 16 OF 19 HCA COPYRIGHT 2000 ACS
 70:83676 Gelled sulfuric acid batteries and fuel cells
 . Michaels, Alan S. (Amicon Corp.). U.S. US 3419430 19681231, 3
 pp. Continuation-in-part of U.S. 3324068 (English). CODEN: USXXAM.
 APPLICATION: US 19660926.

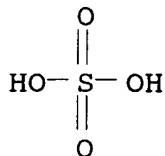
AB Pb-H₂SO₄ storage batteries in which the H₂SO₄ is
 in solid form are described. The electrolyte is identical to
 conventional aq. electrolytes with regard to the nature of the
 dissolved electrolyte and the relative proportions of water and
 electrolyte. It is solidified by including it in a solid gel mass
 of ionically cross-linked polycationic and polyanionic polymers,
 formed as described in U.S. 3,271,496. To illustrate, a solid
 finely divided ionically cross-linked polyanionic-polycationic
 polymer complex was prep'd. by dissolving .apprx.100 parts by wt. of
 dry powd. poly(Na styrenesulfonate) together with 333 parts by wt.
 of an aq. soln. contg. 30% by wt. of poly(vinyl-
 benzyltrimethylammonium chloride) in a soln. consisting of 266 parts
 of 1,4-dioxane, and 33 parts of water, and dilg. the resultant
 viscous syrup with cold tap water to ppt. a slurry which was then
 filtered, washed, dried, and ground to pass a 20-mesh sieve. The
 sole crosslinks present in the solid resin complex were ionic
 crosslinks. A mixt. was prep'd. contg. 150 g. H₂SO₄ and 30
 g. distd. H₂O, then, 30 g. of the finely divided solid crosslinked
 resin complex described above was stirred in. Then, 90 g. MeOH and
 .apprx.5 drops of a fluorinated surface-active agent (FC-170) were
 added. The surface-active agent was used to improve the flow and

leveling properties of the soln.; this mixt. was placed in a tightly sealed jar and left on a roll mill for 24 hrs. A viscous soln. was formed which was subjected to centrifugation for 5 min. One side of an 8 .times. 9 .times. 1/8 in. glass plate was covered with 2 mil Teflon film and subsequently with polypropylene nonwoven fabric (1.4 mils). The Teflon and polypropylene were held in place with ordinary masking tape along their margins. Care had to be taken to avoid surface wrinkles. A 25-mil drawdown was made by using the supernatant centrifuged soln. on the covered plate with an adjustable, stainless steel drawdown bar. The drawdown was placed in an air circulation oven for 1/2 hr. at 55.degree. and subsequently heated in a vacuum oven at a pressure of 28 in. Hg for 2 hrs. at 85.degree., then cooled in a desiccator. A 2nd drawdown was made over the 1st, this time with a clearance of 37.5 mils, and the drying cycle described above was repeated. The drawdown plus drying cycle was repeated twice again at drawdown bar clearances of 50 and 62.5 mils, resp. After the last drawdown, the material was allowed to cool slowly in the vacuum oven over a period of .apprx.6 hrs. with a vacuum of 28 in. Hg being maintained. After cooling, the gel was removed from the plate with a razor blade. The polypropylene nonwoven fabric adhered firmly to the gel and served as a support, while the assemblage was readily released from the Teflon casting surface. Two such assemblages, each having a thickness of .apprx.30 mils, were laminated together in a press at room temp. The thickness was held to 52 mils by shims. After pressing, the assemblage was cut to form sqs. of 2 .times. 2 in. Two of these squares of solid gel mass were then equilibrated with H₂SO₄ having sp. gr. 1.260 (conventional battery acid). A 3-plate cell (2 neg. plates and 1 pos., each 2 in. sq.) was constructed from conventional pasted and dry charged Pb plates of the type used in conventional Pb-H₂SO₄ batteries, and the plates were immersed in conventional battery acid and drained. The 2 sqs. of solid gel mass were then inserted on opposite sides of the pos. electrode or plate in the plate assembly, between the pos. and neg. plates. The entire assembly, which contained no appreciable quantity of free liq. H₂SO₄ apart from the electrolyte contained in a solid gel mass and in the Pb plates, was then inserted into a tight fitting cell so that the plates were pressed firmly against the solid gel masses. The cell withstood 18 cycles of charging and discharging without failure. The cell capacity increased from an initially rather low value to .apprx.1 amp. hr. (at a rate of 0.5 amp.) after 5 cycles. Similar results may be obtained by using other org. solvents, such as tetrahydrofuran, during the prepn. of the solid gel mass, or by omitting the org. solvent.

IT 7664-93-9, uses and miscellaneous
(gelation of, for battery electrolytes)

RN 7664-93-9 HCA

CN Sulfuric acid (8CI, 9CI) (CA INDEX NAME)



NCL 136026000
 CC 77 (Electrochemistry)
 IT Fuel cells
 (with sulfuric acid gelled electrolytes)
 IT 7664-93-9, uses and miscellaneous
 (gelation of, for battery electrolytes)

L96 ANSWER 17 OF 19 HCA COPYRIGHT 2000 ACS
 70:53426 Carbonaceous fuel cell electrode. Folkins,
 Hillis O.; Beber, Oral L. (Union Oil Co. of California). U.S. US
 3413152 19681126, 3 pp. (English). CODEN: USXXAM. APPLICATION: US
 19650730.

AB A 2-layer electrode was prep'd. by mixing 1.0 g. of calcined petroleum carbon of .apprx.150 mesh with 0.15 g. com. corn syrup at 75.degree.F. forming the matrix of the electrode by placing the mix in a mold to a depth of 1/16 in., and applying to the matrix a catalytic layer consisting of a mixt. of 0.5 g. of 200 mesh calcined petroleum carbon, 0.5 g. Pt black, 0.15 g. corn syrup, and 0.25 g. of Teflon 30 B contg. 0.15 g. of Teflon solids. The laminate was pressed at 15,000 psi. at 75.degree.F. and then calcined in a N atm. for 8 hrs. at 600.degree.F. The electrode was tested as a half-cell for the oxidn. of H₂ in M H₂SO₄ at room temp. using a calomel reference electrode. The 2-layer electrode produced a c.d. of 500 ma./cm.² of electrode surface at +0.005 v. vs. S.C.E. and a polarization of only 0.245 v. from the open circuit voltage of -0.24 v.

NCL 136086000
 CC 77 (Electrochemistry)
 ST fuel cell electrodes; electrodes fuel cell; carbonaceous electrodes fuel cells ; hydrogen fuel cells
 IT Fuel cells
 (electrodes, two-layer carbonaceous catalytic)
 IT Electrodes
 (fuel-cell, two-layer carbonaceous catalytic)

L96 ANSWER 18 OF 19 HCA COPYRIGHT 2000 ACS
 70:16649 Fuel-cell electrodes. Landi, Henry P.
 (American Cyanamid Co.). U.S. US 3407096 19681022, 4 pp.
 (English). CODEN: USXXAM. APPLICATION: US 19660125.

AB Self-supporting, porous, unsintered, extensively fibrillated electrode structure are prep'd. by mixing 60-98 parts poly(methyl methacrylate) I, 2-40 parts poly(tetrafluoroethylene) II, (particle size 0.05-1.0 .mu.) and 2-98 parts filler (50-98% of the electrode

structure), such as graphite, powd. C, Ni, Ta, and carbides of W or Ti, at 170-200.degree. and after cooling, extruding into a sheet. The I is extd. with Me₂CO and substituted by 1-10 mg. catalyst of noble metals or Ni, Ag, and Hg-Ag mixts. per cm.² of surface. Other inert thermoplastic resins can be substituted for 5-95% II. The structure has tensile modulus of elasticity of .apprx.8000 psi., elongation at rupture .gt;req.25%, porosity 50-75%, mean pore diam. 0.2-1 .mu., and permeability to 6M phosphoric acid at 25.degree. equal to at least 1 atm. (permeability is defined as pressure required to force aq. electrolyte through electrode structure). Thus, 5 parts 60% aq. emulsion of II and 20 parts graphite is blended into 95 parts I at 170-5.degree.. After cooling and grinding into pellets, these are injection-molded to form 1/8 .times. 2 .times. 4 in. plaques. The sheet is compression-molded at 180-200.degree. under a pressure of 1000 psi. The sheet is immersed in Me₂CO for 16 hrs. at 25.degree. and washed twice with Me₂CO for 1-2 hrs. The sheet (9-11 mils thick) is impregnated with 10% soln. of chloroplatinic acid in EtOH, dried and subjected to N₂ at 300.degree., and then to H₂ at 100.degree. for 30 min. The catalyzed electrode contains 1.3 mg. Pt/cm.² When used as the H electrode in a cell contg. 9 mg. Pt/cm.² standard electrode and 5N H₂SO₄ electrolyte at 70.degree. and 0.85 v., the c.d. was 8 ma./cm.² and in a cell utilizing 5N KOH, the c.d. was 70 ma./cm.², as the O electrode vs. the same reference electrode in the same cell at 70.degree. and 0.75 v., in 5N H₂SO₄, the c.d. was 2 and in 5N KOH the c.d. was 200 ma./cm.²

IT 9002-84-0, uses and miscellaneous
(fuel-cell electrode matrix)

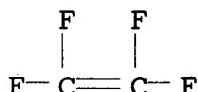
RN 9002-84-0 HCA

CN Ethene, tetrafluoro-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 116-14-3

CMF C2 F4



NCL 136086000

CC 77 (Electrochemistry)

ST fuel cells electrodes; electrodes fuel cells; platinum fuel cell electrodes; hydrogen electrodes fuel cells; oxygen electrodes fuel cells

IT Fuel cells
(electrodes, self-supporting porous, with polymer matrix)

IT Electrodes
(fuel-cell, self-supporting, with polymer

matrix)
IT 9011-14-7, uses and miscellaneous
(fuel-cell electrode matrix)
IT 9002-84-0, uses and miscellaneous
(fuel-cell electrode matrix)

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(FILE 'HCA' ENTERED AT 11:03:44 ON 31 AUG 2000)

FILE 'REGISTRY' ENTERED AT 11:17:33 ON 31 AUG 2000

FILE 'HCA' ENTERED AT 11:18:40 ON 31 AUG 2000

L97 FILE 'LCA' ENTERED AT 11:53:47 ON 31 AUG 2000
32135 S (PRODUC? OR PROD# OR GENERAT? OR MANUF? OR MFR# OR CREA

L98 FILE 'HCA' ENTERED AT 11:57:09 ON 31 AUG 2000
66554 S L97(3A)MEMBRAN?

L99 3022 S L98 AND L50

L100 120 S L99 AND (L46 OR L47 OR L52)

L101 7 S L100 AND (L73 OR L48 OR L49)

L102 0 S L100 AND L6

L103 11 S L99 AND (L45 OR L47 OR L52)

L104 789 S L99 AND (L46 OR ACID?)

L105 18 S L104 AND (L73 OR L48 OR L49)

L106 3 S L104 AND L6

L107 21 S (L101 OR L103 OR L105 OR L106) NOT (L91 OR L94 OR L92 O

L108 17 S L107 NOT (L93 OR L96)

=> d 1108 1-17 ti

L108 ANSWER 1 OF 17 HCA COPYRIGHT 2000 ACS

TI Ion exchanging membranes having high ion conductivity and manufacture thereof

L108 ANSWER 2 OF 17 HCA COPYRIGHT 2000 ACS

TI Ion-exchange membranes with high ion conductivity and their manufacture

L108 ANSWER 3 OF 17 HCA COPYRIGHT 2000 ACS

TI Polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer

L108 ANSWER 4 OF 17 HCA COPYRIGHT 2000 ACS

TI Polychelatogen-coated steel plate with good anticorrosive abrasion resistance

L108 ANSWER 5 OF 17 HCA COPYRIGHT 2000 ACS

TI Anion effects on vesicle acidification in Dictyostelium

L108 ANSWER 6 OF 17 HCA COPYRIGHT 2000 ACS

TI Microporous membranes of uniform ultrahigh molecular weight polyethylene and their manufacture

L108 ANSWER 7 OF 17 HCA COPYRIGHT 2000 ACS

TI A thin porous polyantimonic acid based membrane as a separator in alkaline water electrolysis

L108 ANSWER 8 OF 17 HCA COPYRIGHT 2000 ACS
TI Manufacturing porous m mbran for gas separation

L108 ANSWER 9 OF 17 HCA COPYRIGHT 2000 ACS
TI Fluorocarbon cation-exchange membrane and electrolysis process using this membrane

L108 ANSWER 10 OF 17 HCA COPYRIGHT 2000 ACS
TI Aromatic araliphatic polymers containing phosphoramido groups

L108 ANSWER 11 OF 17 HCA COPYRIGHT 2000 ACS
TI In situ formation of cellulose acetate carbamate Dry-RO membranes

L108 ANSWER 12 OF 17 HCA COPYRIGHT 2000 ACS
TI Membranes for separation of liquid mixtures

L108 ANSWER 13 OF 17 HCA COPYRIGHT 2000 ACS
TI Phosphorylated cellulose ester membranes

L108 ANSWER 14 OF 17 HCA COPYRIGHT 2000 ACS
TI Diaphragms for electrochemical cells

L108 ANSWER 15 OF 17 HCA COPYRIGHT 2000 ACS
TI Substance-transporting membrane

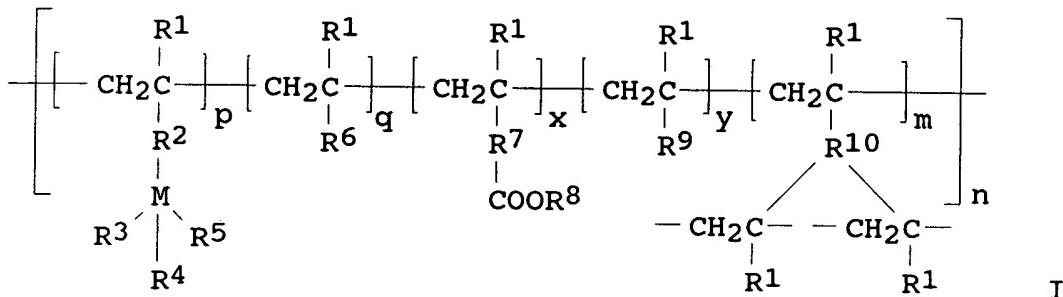
L108 ANSWER 16 OF 17 HCA COPYRIGHT 2000 ACS
TI Electrolyte membranes based on ethenesulfonic acid copolymers

L108 ANSWER 17 OF 17 HCA COPYRIGHT 2000 ACS
TI Water removal from solutions by using osmotic membranes treated with stabilizing agents

=> d 1108 1-3,6,7,8,12,14,15,16 cbib abs hitstr hitind

L108 ANSWER 1 OF 17 HCA COPYRIGHT 2000 ACS
133:136439 Ion exchanging membranes having high ion conductivity and manufacture thereof. Arimura, Tomoaki (Nissan Motor Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000212305 A2 20000802, 13 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-11705 19990120.

GI



AB Title membranes, useful for solid-polymer fuel cells, electrochem. sensors, etc., comprise crosslinked ion exchangers I (R1 = H, aliph. group, arom. group; M = 1- to 4-valent metal; R2, R7 = aliph. group, arom. group, single bond; R3-R5 = aliph. group, arom. group; R6 = arom. group; R8 = H, aliph. group; R9 = acidic part-contg. aliph. or arom. group; R10 = aliph. or arom. group having 3 crosslinking groups; p = 1-350; q = 1-500; x = 1-600; yr = 1-300; m = 1-200; n = 10-10000). Thus, a soln. contg. 11.26 g acrylic acid and 2.77 g 2-acrylamido-2-methylpropanesulfonic acid was added dropwise into a soln. contg. dimethylethoxyvinylsilane 2.27, styrene 1.95, and triallyl cyanurate 0.0667 g to give a polymer, which was mixed with DMF to adjust viscosity 100 SP and cast on an Al plate to give a membrane showing ion cond. 0.2 S/cm.

ICM C08J005-22

ICS G01N027-333; H01M008-02

CC 38-3 (Plastics Fabrication and Uses)

ST ion exchanging membrane manuf;

methoxyvinylsilane styrene acrylic acid copolymer; acrylamidopropanesulfonic acid triallyl cyanurate copolymer; solid polymer fuel cell ion conductor; electrochem sensor ion conductor membrane

IT Fuel cells

(solid polymer; ion exchanging membranes having high ion cond. and manuf. thereof)

L108 ANSWER 2 OF 17 HCA COPYRIGHT 2000 ACS

132:294823 Ion-exchange membranes with high ion conductivity and their manufacture. Arimura, Tomoaki (Nissan Motor Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2000119420 A2 20000425, 14 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-297266 19981019.

AB The membranes, useful for solid-polymer fuel cells, electrochem. sensors, etc., are made of ion exchangers consisting of arom. group unit $\text{CHR}_1\text{CR}_2(\text{ArR}_3\text{R}_4)$ (I), carboxyl group unit $\text{CH}_2\text{CR}_5\text{R}_6(\text{CO}_2\text{H})$ (II), orientation group unit CH_2CHR_7 (III), strongly acidic group unit CH_2CHR_8 (IV), and crosslinking unit $\text{CH}_2\text{CHR}_9\text{CH}_2\text{CH}$ (V) represented by $(\text{IhIII}^{\text{h}}\text{III}^{\text{i}}\text{I}^{\text{j}}\text{V}^{\text{k}}\text{Vm})_n$ ($\text{h}, \text{i}, \text{j}, \text{k}, \text{m}, \text{n} = \text{d.p. and } 1-300, 1-400, 1-50, 1-150, 1-40, \text{ and } 10-1000, \text{ resp.}$) and are manufd. by polymg. the corresponding monomers in the mol.

ratio of (0.2-10):(0.1-8):(0.01-1.0):(0.1-10):(0.01-1.0). Thus, an aq. soln. contg. 2-acrylamido-2-methylpropanesulfonic acid 10, acrylic acid 6.96, and (NH₄)₂S₂O₈ 0.10 g was added dropwise to DMF contg. styrene 10.06, 2-vinylnaphthalene 0.744, 3,9-divinyl-2,4,8,10-tetraoxaspiro[5.5]undecane 0.923, and AIBN 0.20 g and heated to give a polymer (h, i = 60, j = 10, k = 30, m = 3, n = 10) soln., which was filtered and cast to form a film showing ion cond. 0.224 S/cm.

- IC ICM C08J005-22
 ICS C08J005-22; C08F008-00; C08F210-00; C08F212-04; C08F220-04;
 C08F228-02; G01N027-333; H01M008-02
- CC 38-3 (Plastics Fabrication and Uses)
- ST vinylnaphthalene acrylamidosulfonic acid polymer ion exchanger; styrene acrylic acid polymer ion exchanger; orientation polymer ion exchanger
- IT Cation exchange membranes
 (manuf. of ion-exchange membranes with high ion cond.)
- IT 264907-08-6P, 2-Acrylamido-2-methylpropanesulfonic acid -acrylic acid-3,9-divinyl-2,4,8,10-tetraoxaspiro[5.5]undecane-styrene-2-vinylnaphthalene copolymer
 264908-72-7P, Allylsulfonic acid-divinylspiro[4.4]nonane-vinylacetic acid-vinylcyclohexane-vinylpyridine copolymer
 264908-75-0P, 2-Acrylamido-2-methylpropanesulfonic acid -.alpha.-chlorostyrene-divinylspiro[3.5]nonane-vinylbutanoic acid-N-vinylcarbazole copolymer 264908-78-3P
 (manuf. of ion-exchange membranes with high ion cond.)

L108 ANSWER 3 OF 17 HCA COPYRIGHT 2000 ACS
 132:168639 Polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer. Pugazhendhi, P.; Raja, M.; Sasikumar, G.; Sridhar, P. (Centre for Electrochemical and Energy Research, SPIC Science Foundation, Chennai, India). Bull. Electrochem., 15(9-10), 353-356 (English) 1999. CODEN: BUEL6. ISSN: 0256-1654. Publisher: Central Electrochemical Research Institute.

- AB PEMFC electrodes generally contain three layers, backing layer made of teflonized carbon cloth or carbon paper, diffusion layer consisting of carbon powder and Teflon, and catalyst layer. The catalyst layer contains platinum catalyst in the form of Pt-black or platinum supported on carbon, Teflon and perfluorosulfonic acid and polymer. Teflon was thought to be essential in the catalyst layer and many investigations have been carried out on the effect of Teflon content in the catalyst layer on electrode performance. The investigations at Los Alamos National Lab. have demonstrated high performance even by completely eliminating Teflon in the catalyst layer. This method of prep. enables the electrode to retain the max. amt. of water on the active layer and, hence, to maintain the high ionic cond. This procedure involves casting the catalyst layer on the membrane from slurry of Pt/C and Nafion ionomer. The difficulty assocd. with this method of

prepn. is in providing a robust structure from solubilized ionomer because such recast films are very fragile. This problem was addressed by casting the m mbrane in the sodium form. In an updated version of the original fabrication process, thin film catalyst layers are reported to have been cast from supported platinum catalyst and solubilized ionomer in the TBA⁺ form. However, in this method of catalyzing the membrane, the difficulty experienced was in removing TBA⁺ since the hydrophobic TBA⁺ cation is relatively difficult to ion-exchange.

- CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
 ST polymer electrolyte membrane fuel cell electrode catalyst
 IT Polyoxyalkylenes, uses
 (fluorine- and sulfo-contg., ionomers; polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT Fuel cell electrodes
 Fuel cells
 (polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT Carbon black, uses
 (polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT Fluoropolymers, uses
 (polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT Fluoropolymers, uses
 (polyoxyalkylene-, sulfo-contg., ionomers; polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT Ionomers
 (polyoxyalkylenes, fluorine- and sulfo-contg.; polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT 7440-44-0, Carbon, uses
 (cloth; polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT 7440-06-4, Platinum, uses
 (polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)
 IT 9002-84-0, Teflon
 (polymer electrolyte membrane fuel cell electrodes with hydrophilic catalyst layer)

L108 ANSWER 6 OF 17 HCA COPYRIGHT 2000 ACS

119:119043 Microporous membranes of uniform ultrahigh molecular weight polyethylene and their manufacture. Yasugata, Koichi (Asahi Chemical Industry Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 05009332 A2 19930119 Heisei, 6 pp. (Japanese). CODEN: JKXXAF.
 APPLICATION: JP 1991-165867 19910705.

AB The membranes have 3-dimensional network structure and following features: porosity 40%, gas permeation 450 s/100 cm³, .gtoreq.4000

kg/cm² elastic modulus along the machine direction, .gtoreq.400% elongation at break in the direction normal to the machine direction, bubble point in EtOH 2-10 kg/cm², ratio of av. pore diam. to max. pore diam. .ltoreq.1.6. Polyethylene (I, av.-viscosity mol. wt. .gtoreq.2,000,000) mixts. with inorg. powders and 2-component plasticizer mixts. (one has SP value 7.5-8.4 and loaded to 10-150% of I; the other has SP values 8.5-9.5) are mixed, heat kneaded, melted, and molded into sheets, followed by extn. of the powders and plasticizers from the sheet, drying, and uniaxial extension to give the membranes.

- IT 1343-98-2P, Silicic acid
(ultrahigh-mol.-wt. polyethylene blends contg. plasticizers and powders of, microporous membranes from, manuf. of)
- RN 1343-98-2 HCA
- CN Silicic acid (8CI, 9CI) (CA INDEX NAME)
- *** STRUCTURE DIAGRAM IS NOT AVAILABLE ***
- IC ICM C08J009-26
ICS B01D071-26; C08J009-26; H01M002-16
- ICI C08L023-04
- CC 38-3 (Plastics Fabrication and Uses)
- ST ultrahigh mol wt polyethylene membrane manuf;
inorg powder plasticizer UHMWPE membrane
- IT Plasticizers
(dioctyl phthalate, ultrahigh-mol.-wt. polyethylene blends contg.
silicic acid powders and, microporous membranes from,
manuf. of)
- IT 117-81-7P, Dioctyl phthalate
(plasticizers, ultrahigh-mol.-wt. polyethylene blends contg.
silicic acid powders and, microporous membranes from,
manuf. of)
- IT 1343-98-2P, Silicic acid
(ultrahigh-mol.-wt. polyethylene blends contg. plasticizers and
powders of, microporous membranes from, manuf
. of)
- IT 9002-88-4P, Polyethylene
(ultrahigh-mol.-wt., blends contg. inorg. powders and
plasticizers, microporous membranes from, manuf
. of)

L108 ANSWER 7 OF 17 HCA COPYRIGHT 2000 ACS

106:109970 A thin porous polyantimonic acid based membrane as a separator in alkaline water electrolysis. Leysen, R.; Doyen, W.; Proost, R.; Vandenborre, H. (Studiecent. Kernenerg., CEN, Mol, B-2400, Belg.). Membr. Membr. Processes, [Proc. Eur.-Jpn. Congr. Membr. Membr. Processes], Meeting Date 1984, 319-26. Editor(s): Drioli, Enrico; Nakagaki, Masayuki. Plenum: New York, N. Y. (English) 1986. CODEN: 550AAY.

AB Polyantimonic acid based membranes were evaluated as separators in H₂O electrolysis. Thin sheets of polyantimonic acid-polysulfone in different wt. ratios were prep'd. using a film casting

technique. According to differences in the prepn. method, the mech. as well as the electrochem. properties of these membranes may be varied. Since OH⁻ exclusion is not a requirement in the use of the membrane as a separator in alk. H₂O electrolysis, membranes were prep'd. having an optimum porous structure in order to obtain a very low resistance to ionic migration. For a 100% polymer film it is known that different types of pores and pore size distributions can be obtained by changing the prepn. parameters. Scanning electron micrographs of these films show the existence of a skin, which contains very fine pores, and underneath there are large fingerlike pores. Measurements of the ionic conduction of these films in alk. medium were carried out and the results show a large scattering.

IT 12712-36-6, Polyantimonic acid
(membranes, for separators in electrolysis of alk. water)
RN 12712-36-6 HCA
CN Antimony oxide (Sb2O5), hydrate (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

CC 72-9 (Electrochemistry)
Section cross-reference(s): 52
IT 12712-36-6, Polyantimonic acid
(membranes, for separators in electrolysis of alk. water)

L108 ANSWER 8 OF 17 HCA COPYRIGHT 2000 ACS
102:47820 Manufacturing porous membrane for gas separation. (Mitsubishi Heavy Industries, Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 59179112 A2 19841011 Showa, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1983-53920 19830331.

AB Mixt. of metatitanic acid sol, alumina sol, and microparticles of silicic acid was molded, dried, and calcined to give a porous membrane. The membrane was mech. strong, had a high heat resistance, and was esp. useful for sepn. of gas. Thus, metatitanic acid 1000 (as TiO₂), alumina sol 400 (as Al₂O₃; hydrolyzate of Al isopropylate), and 25 m.mu. silicic acid 200 g were blended, dried, molded into a tube (diam. = 4 mm, thickness 1 mm), and calcined. The sepn. of H/N and H/CH₄ mixts. with this membrane was better than with a silicic acid-free membrane.

IT 1343-98-2
(porous membrane contg., for gas sepn.)
RN 1343-98-2 HCA
CN Silicic acid (8CI, 9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IC B01D013-04; B01D053-22; C04B021-00
CC 47-2 (Apparatus and Plant Equipment)
IT Membranes
(heat-resistant, manuf. of)
IT 1343-98-2 12026-28-7
(porous membrane contg., for gas sepn.)

L108 ANSWER 12 OF 17 HCA COPYRIGHT 2000 ACS

92:59994 Membranes for separation of liquid mixtures. Takida, Hiroshi; Mizuno, Nobuo; Oshima, Tetsuya (Nippon Synthetic Chemical Industry Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 54135673 19791022 Showa, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1978-40868 19780406.

AB Ethylene-vinyl acetate copolymer (I) or an .alpha.-olefin (C12)-vinyl acetate copolymer was crosslinked with boric acid (II) and saponified to prep. membranes for sepn. of methanol [67-56-1]-Me acetate [79-20-9] or propylbenzene [103-65-1]-cyclohexanol [108-93-0]. Thus, 30:70 (molar) I and 1% II were dissolved in MeOH to 30%, cast on a polyester nonwoven fabric, immersed in 180:20 water-MeOH, saponified in 60:40 water-MeOH contg. 10% NaOH at 30.degree. for 5 h and 50:50 water-MeOH contg. 10% NaOH at 30.degree. for 5 h to give degree of sapon. 72 mol% for the surface layer and 50 mol% for the inner layers, immersed in MeOH at 35.degree. for 60 min, and treated in 30:70 MeOH-MeOAc at 20.degree. for 24 h to give a membrane. A 30:70 MeOH-MeOAc mixt. was sep'd. with the membrane to give MeOH concn. 63%.

IT 11113-50-1
(crosslinking agents, for ethylene-vinyl acetate copolymer membranes for sepn. of liq. mixts.)

RN 11113-50-1 HCA

CN Boric acid (9CI) (CA INDEX NAME)

*** STRUCTURE DIAGRAM IS NOT AVAILABLE ***

IC B01D013-04; C08J005-18

CC 37-3 (Plastics Fabrication and Uses)

IT 11113-50-1

(crosslinking agents, for ethylene-vinyl acetate copolymer membranes for sepn. of liq. mixts.)

L108 ANSWER 14 OF 17 HCA COPYRIGHT 2000 ACS

72:117213 Diaphragms for electrochemical cells. (Siemens A.-G.). Fr. FR 1576202 19690725, 9 pp. (French). CODEN: FRXXAK. PRIORITY: DE 19670818.

AB Porous separators made from synthetic hydrophobic materials are rendered hydrophilic by incorporation of ionic groups through copolymerization of hydrophobic monomers with monomers contg. dissociable groups or by subsequent treatment of a suitable polymer with sulfonation or hydrolysis reagents. Membranes are formed by casting a viscous soln. on a smooth surface and then, perhaps after evapn. of some of the solvent, immersing in a pptn. medium consisting of water or an electrolyte soln. A film may also be extruded into the pptn. medium. Reinforcing materials can be included in the membrane as well as fibrous or particulate substances which may be leached out later to yield macroscopic pores. Examples are given for working with a 93:7 Me methacrylate-methacrylic acid copolymer to give membranes for use in 6N KOH-contg. fuel cells.

A c.d. of 50 mA/cm² at a cell voltage of 820 mV was obtained at room tem p. with a cell contg. two 0.5 mm thick films of this type

serving as subst rates for the electrodes; the anode is Raney Ni and the cathode Raney Ag.

IC H01M; B01K

CC 77 (Electrochemistry)

ST fuel cells electrodes; electrodes fuel cells; polymers fuel cells electrodes; Raney metals fuel cells electrodes; nickel fuel cells electrodes; silver fuel cells electrodes; methacrylate copolymers

IT Fuel cells

(membranes for, hydrophilic)

IT 25086-15-1, uses and miscellaneous
(membranes, fuel-cell)

L108 ANSWER 15 OF 17 HCA COPYRIGHT 2000 ACS

72:67861 Substance-transporting membrane. Oomen, Joris J. C.; Wolters, Donald R. (N. V. Philips' Gloeilampenfabrieken). Ger. Offen. DE 1927968 19700102, 23 pp. (German). CODEN: GWXXBX. PRIORITY: NL 19680618.

AB The title items, which consist of granules embedded in a plastic film, are prep'd. by scattering the granules on an adhesive layer, removing all granules which do not adhere, embedding the layer in a plastic film, and removing the adhesive layer and enough of the plastic film to expose both sides of the granules. Thus, 60-70. μ m. granules of a cation exchange resin (Biorad A9 50 W-16) were scattered on an adhesive isoprene rubber film cast on a glass plate, and granules which did not adhere to the adhesive were removed. A mixt. of 50 g adipic acid-butylene glycol-propanetriol polyester (Desmo phen 1200) in 42 g AcOME and 62.5 g tolylene diisocyanate-trimethylolpr opene prepolymer (Desmodur L) was poured over this layer, air dried, and heated 16 hr at 110.degree., giving a polyurethane film with a layer of ion exchange resin embedded in 1 side. The sides of the granules opposite the adhesive layer were then exposed by treating the polyurethane film with 5% ethanolic KOH, and the adhesive layer was removed with xylene. The membrane was dried 1.5 hr at 110.degree., giving a flexible product with the ion exchange resin granules exposed on both sides. The membrane had elec. resistance 20.6 ohm/cm² in 0.1N KCl, and permselectivity 99% of the total ion transport. Similar products were prep'd. from polystyrene-based ion exchange resin (Bio-Beads X2) and polyimide films. These membranes have good mech. strength and flexibility, contain a high proportion of the ion exchange resin, and are easy to prep. They are useful in dialysis and electrodialysis, fuel cells, accumulators, batteries, gas sepn., filtration, and reverse osmosis.

IC B01D

CC 37 (Plastics Fabrication and Uses)

IT Cation exchangers, preparation
(membranes)

L108 ANSWER 16 OF 17 HCA COPYRIGHT 2000 ACS

71:4228 Electrolyte membranes based on ethenesulfonic acid copolymers. Stoy, Artur; Kubin, Miroslav; Raab, Miroslav (Ceskoslov. Akad. Ved, Prague, Czech.). Abh. Saechs. Akad. Wiss. Leipzig, Math. Naturwiss. Kl., 49(5), 257-65 (German) 1968. CODEN: ASAIAO.

AB Certain types of electrolytic cells energized by the reaction $2\text{H}_2 + \text{O}_2 = 2\text{H}_2\text{O}$ have solid electrolytes in the form of cation exchange membranes which preferably consist of a hydrophobic skeleton (which is not swelled by the electrolyte soln.) in which 70% of a granular cation exchange agent is embedded. Homogenous membranes with cation exchanging acidic groups have better electrochem. properties but are swellable and change their dimensions considerably with concn. of the various ions. Stiffening with a textile material reduces the electrolytic qualities. Intramol. stiffening by copolyrn. of an electrochem. inert monomer could be an advantage. Copolymers of ethenesulfonic acid (I) with acrylonitrile (II) can be considered as model substances. The large variability in using these copolymers in membranes for fuel cells lies in their solv. in volatile org. solvents and in nonvolatile but easily extractable org. solvents. II decreases swelling and makes possible an enduring orientation because of its high cohesive forces. Its resistance to hydrolysis is not inferior to that of the already employed copolymers with N,N'-methylene-bismethacrylamide and ethylene dimethacrylate. Ternary copolymers of ethenesulfonic acid with acrylamide-acrylonitrile were dissolved in aq. HCONMe₂ to obtain membranes by casting onto a horizontal plate and stretching at various temps. in the swollen or nonswollen state. The stretched membranes were treated with HCHO to fix orientation and to reduce ultimate elongation at break and swelling. Casting on glass plates was adopted since casting on a Hg surface was not esp. successful. Binary copolymers of acrylonitrile-ethenesulfonic acid at mol. ratios 2:1 and 5:1 can be cast and the treatment with HCHO can be omitted. Acrylonitrile is copolymd. with Na ethenesulfonate in concd. aq. ZnCl₂ yielding a rubbery elastic membrane which is stretched and washed with H₂O. The copolymers are softer than the polymers of acrylonitrile alone. Copolyrn. in ZnCl₂ soln. (d. 1.95-2.05) between 2 glass plates takes place with NH₄ persulfate-K pyrosulfite redox initiator at room temp. Addn. of 0.2-1.0% ethylene dimethacrylate reduces tackiness of the membrane. ZnCl₂ must be removed by repeated washing in ice-water. The S content is 5 wt.% of the copolymer. The improved mech. properties are tabulated.

CC 37 (Plastics Fabrication and Uses)

ST ethenesulfonic acid copolymers; copolymers ethenesulfonic acid; acrylonitrile copolymers; cation exchange membranes; ion exchange membranes; fuel cell membranes; electrolytic cell membranes

IT Membranes

(cation-exchanging, for fuel cells)

IT Fuel cells

- IT (membranes for, cation-exchanging)
Cation exchangers, preparation
 (membranes, for fuel cells)
- IT 25722-86-5, uses and miscellaneous 26966-21-2, uses and
miscellaneous 26966-22-3, uses and miscellaneous
 (cation-exchanging membranes from, for fuel
cells)